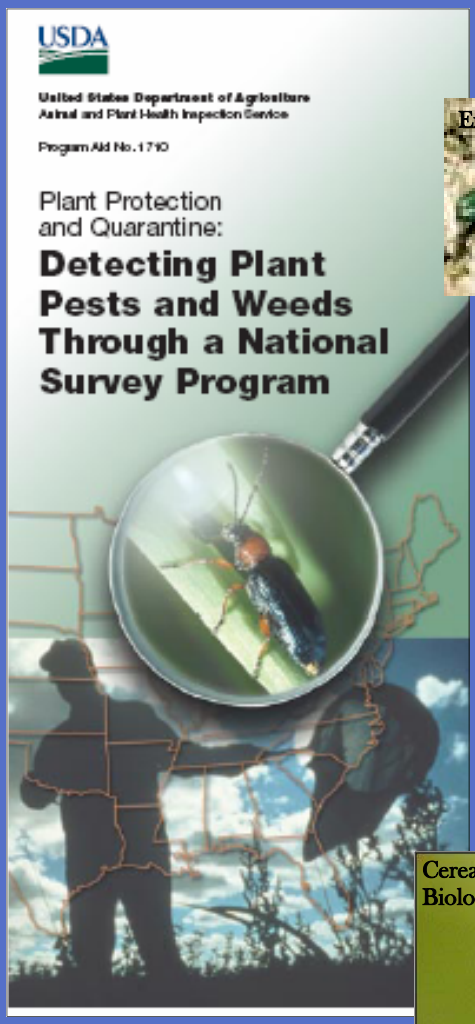
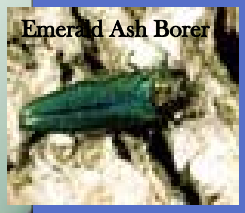
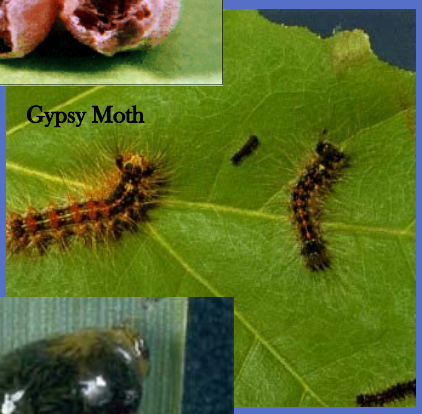
Montana Department of Agriculture
Cooperative Agricultural Pest Survey
2004 Report




Emerald Ash Borer


Asian Longhorned Beetle


Karnal Bunt


Gypsy Moth


European Pine Shoot
Moth


Cereal Leaf Beetle Larvae


Cereal Leaf Beetle
Biological Control


Sudden Oak Death


Banded Elm Bark Beetle


Japanese Beetle

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2004 Surveys

European and Asian Gypsy Moth
Karnal Bunt
Japanese Beetle
European Pine Shoot Moth
Sudden Oak Death
Cereal Leaf Beetle
Cereal Leaf Beetle Biological Control
Exotic Woodborer Beetles

This report was compiled by Patricia Denke, Kimberly Merenz, and Lori Witham

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2004 CAPS Report
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Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program
Gypsy Moth Survey Report
2004

Compiled by Patricia Denke

Gypsy moth (*Lymantria dispar* L) was initially introduced in the eastern U. S. as a potential source of silk. While silk production using this insect did not follow, it did become established as a defoliating pest of various trees, and has spread throughout the eastern U. S. The females oviposit on various surfaces, and generally cover the eggs with hairs or scales, which hides the egg masses when they are on surfaces such as tree trunks. Because the females are relatively opportunistic in terms of surfaces, in areas with high population densities, they may oviposit on vehicles, and other movable objects.

In addition, the moths may "hitchhike" on vehicles. This can result in movement of the insects throughout the country. In order to detect, and hopefully intercept these movements, networks of traps for gypsy moth have been established throughout most states, including Montana.

In Montana, responsibility for the gypsy moth traps is divided between several groups, including United States Department of Agriculture, Animal Plant Health Inspection Service, Plant Protection Quarantine (APHIS) (which has responsibility for the eastern portion of the state), the Montana Department of Natural Resources and Conservation (DNRC), the USDA Forest Service, and the Montana Department of Agriculture (MDA).

During 2004, the MDA placed traps in areas normally serviced by the DNRC, to cover manpower constraints being experienced by that department. The MDA placed over 280 traps. However, only 277 recovered traps are being reported. During 2004, several traps were destroyed, primarily by road construction.

Nine traps were placed in the vicinity of Townsend, Montana, in response to a report in the late fall of 2003 of a shipment of decorative barrels to that area from a nursery in another state where a gypsy moth was trapped. As a result of a single gypsy moth collected in a pheromone trap in Browning, MT (Glacier County) during 2003, APHIS personnel put out a delimitation grid there in 2004.

No suspect gypsy moths were detected in traps collected in Montana during 2004.

Counties with gypsy moth traps placed by MDA personnel, and number of traps, in Montana, during 2004.

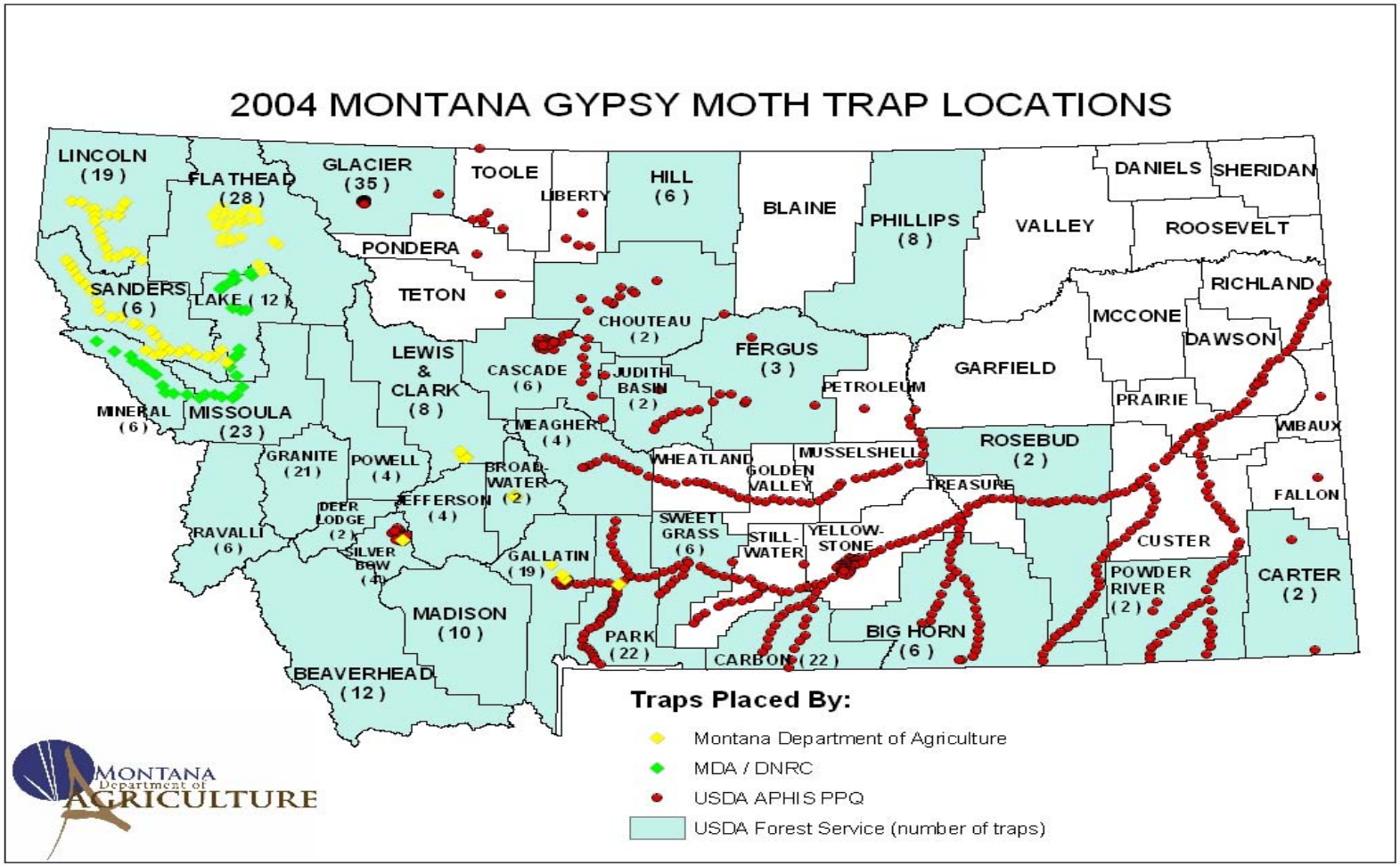
County	No. of traps	Date Placed	Date Removed	No. Pos. Finds
Broadwater	18	23 June 2004	4 Sept 2004	0
Broadwater (Townsend)	9	23 June 2004	4 Sept 2004	0
Gallatin	3	13 June 2004	4 Sept 2004	0
Park	2	15 July 2004	4 Sept 2004	0
Lewis & Clark	40	21 June 2004	11 Sept 2004	0
Silverbow	3	13 July 2004	18 Sept 2004	0
Missoula	52			0
Lake	35	17 June 2004	15 Oct 2004	0
Lincoln	27	17 June 2004	15 Oct 2004	0
Sanders	32	17 June 2004	15 Oct 2004	0
Mineral	17	15 June 2004	15 Oct 2004	0
Flathead	39	16 June 2004	15 Oct 2004	0
Total	277			0

Counties with gypsy moth traps placed by USDA Forest Service and cooperators during 2004 on federally administered lands.

County	No. of traps	No. Pos. Finds
Beaverhead	12	0
Big Horn	6	0
Broadwater	2	0
Carbon	22	0
Carter	2	0
Cascade	6	0
Chouteau	2	0
Deer Lodge	2	0
Fergus	3	0
Flathead	28	0
Gallatin	19	0
Glacier	35	0
Granite	21	0
Hill	6	0
Jefferson	4	0
Judith Basin	2	0
Lake	12	0
Lewis & Clark	8	0
Lincoln	19	0
Madison	10	0
Meagher	4	0
Mineral	6	0
Missoula	23	0
Park	22	0
Phillips	8	0
Powder River	2	0
Powell	4	0
Ravalli	6	0
Rosebud	2	0
Sanders	6	0
Silver Bow	4	0
Sweetgrass	6	0
Total	314	0

Counties with traps placed by APHIS during 2004.

County	No. of traps	No. Pos. Finds
Big Horn	28	0
Carbon	20	0
Carter	2	0
Cascade	26	0
Chouteau	10	0
Custer	38	0
Dawson	13	0
Fallon	1	0
Fergus	6	0
Gallatin	15	0
Glacier	34	0
Golden Valley	7	0
Judith Basin	8	0
Liberty	4	0
Meagher	12	0
Musselshell	10	0
Park	39	0
Petroleum	4	0
Pondera	1	0
Powder River	25	0
Prairie	12	0
Richland	12	0
Rosebud	27	0
Silverbow	23	0
Stillwater	20	0
Sweet Grass	16	0
Toole	8	0
Treasure	12	0
Wheatland	1	0
Wibaux	30	0
Yellowstone	51	0
Total	515	0


2004 MONTANA GYPSY MOTH TRAP LOCATIONS
LINCOLN (19)
FLATHEAD (28)
GLACIER (35)
TOOLE
LIBERTY
HILL (6)
BLAINE
PHILLIPS (8)
VALLEY
DANIELS
SHERIDAN
ROOSEVELT
PONDERA
SANDERS (6)
LAKE (12)
TETON
CHOUTEAU (2)
RICHLAND
MCCONE
DAWSON
LEWIS & CLARK (8)
CASCADE (6)
JUDITH BASIN (2)
FERGUS (3)
GARFIELD
PETROLEUM
PRAIRIE
MINERAL (6)
MISSOULA (23)
MEAGHER (4)
WIBAUX
ROSEBUD (2)
GRANITE (21)
POWELL (4)
BROAD-WATER (2)
WHEATLAND
MUSSELSHELL
GOLDEN VALLEY
TREASURE
FALLON
DEER LODGE (2)
JEFFERSON (4)
RAVALLI (6)
SILVER BOW (4)
GALLATIN (19)
SWEET GRASS (6)
STILL-WATER
YELLOW-STONE
CUSTER
POWDER RIVER (2)
CARTER (2)
MADISON (10)
PARK (22)
CARBON (22)
BIG HORN (6)
BEAVERHEAD (12)
Traps Placed By:
Montana Department of Agriculture
MDA / DNRC
USDA APHIS PPQ
USDA Forest Service (number of traps)
MONTANA Department of AGRICULTURE

Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program
Karnal Bunt Survey Report
2004

Compiled by Kimberly Merenz

Karnal bunt is a disease of wheat and triticale that is caused by the fungus *Tilletia indica.* This disease is influenced by weather and climatic conditions. The most severe infections occur when there is cool, wet weather when the wheat is heading out. Montana has participated in the national survey since 1996.

Karnal bunt is not known to occur in Montana. Our participation in the national survey is necessary to confirm that production areas in Montana are free of Karnal bunt. Freedom from Karnal Bunt is a requirement for export markets. Karnal bunt is considered a priority pest nationwide and is identified on the CAPS Western Region Pest List.

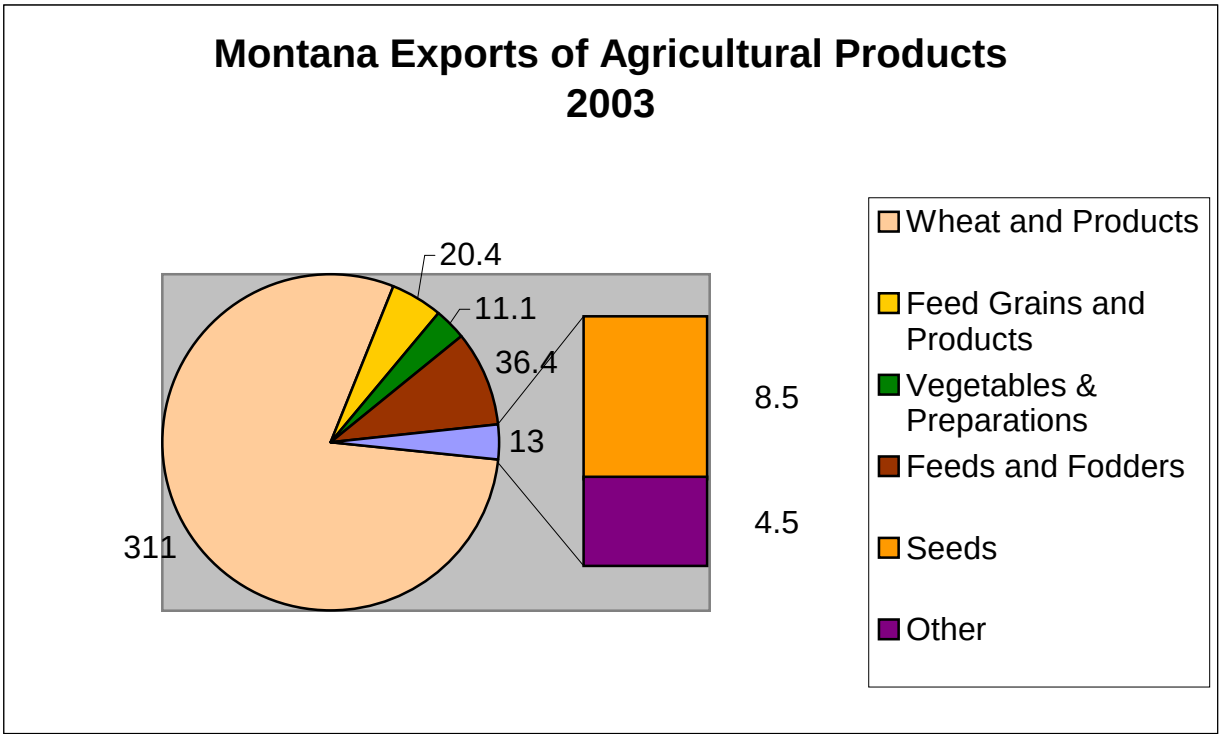
Montana's wheat industry is a valuable component of Montana agriculture. In 2004 Montana produced over 173 million bushels of wheat. Our ranking for 2003 was 4th in the nation for total wheat production and 2nd for durum wheat production. Wheat and wheat products are Montana's leading exports, making up 78% of the state's agricultural exports in 2003. Our participation in this survey has provided valuable information in the form of negative analyses to support the export of Montana wheat to foreign markets.

Agricultural Exports for Montana and the United States 1/, 2/

Commodity	MONTANA			UNITED STATES		
	2001	2002	2003	2001	2002	2003
	Million Dollars					
Wheat and Products	232.3	197.9	311.3	4,508.8	4,793.6	5,326.8
Feed Grains and Products	22.6	14.6	20.4	6,533.7	6,795.6	6,731.0
Fruits and Preparations	--	--	--	3,501.7	3,433.5	3,545.3
Vegetables and Preparations	12.6	14.0	11.1	4,511.2	4,545.3	4,675.6
Live Animals and Meat	13.4	12.9	6.7	6,293.2	6,098.5	6,483.0
Hides and Skins	1.2	0.9	0.9	1,932.9	1,777.3	1,790.3
Poultry and Products	0.3	0.2	0.3	2,518.6	2,280.1	2,105.4
Fats, Oils and Greases	0.2	0.2	0.3	320.0	428.0	538.5
Dairy Products	--	--	--	1,120.9	1031.2	1033.2
Feeds and Fodders	27.6	30.0	36.4	2,143.7	1,950.5	1,998.7
Seeds	9.8	10.7	8.5	727.1	833.1	812.8
Other	5.9	6.6	4.5	18,586.3	19,324.2	21,145.4
ALL COMMODITIES 2/	325.9	288.1	400.3	52,698.2	53,291.2	56,186.4

1/ Fiscal year ending September 30. 2/ Totals may not add due to rounding.

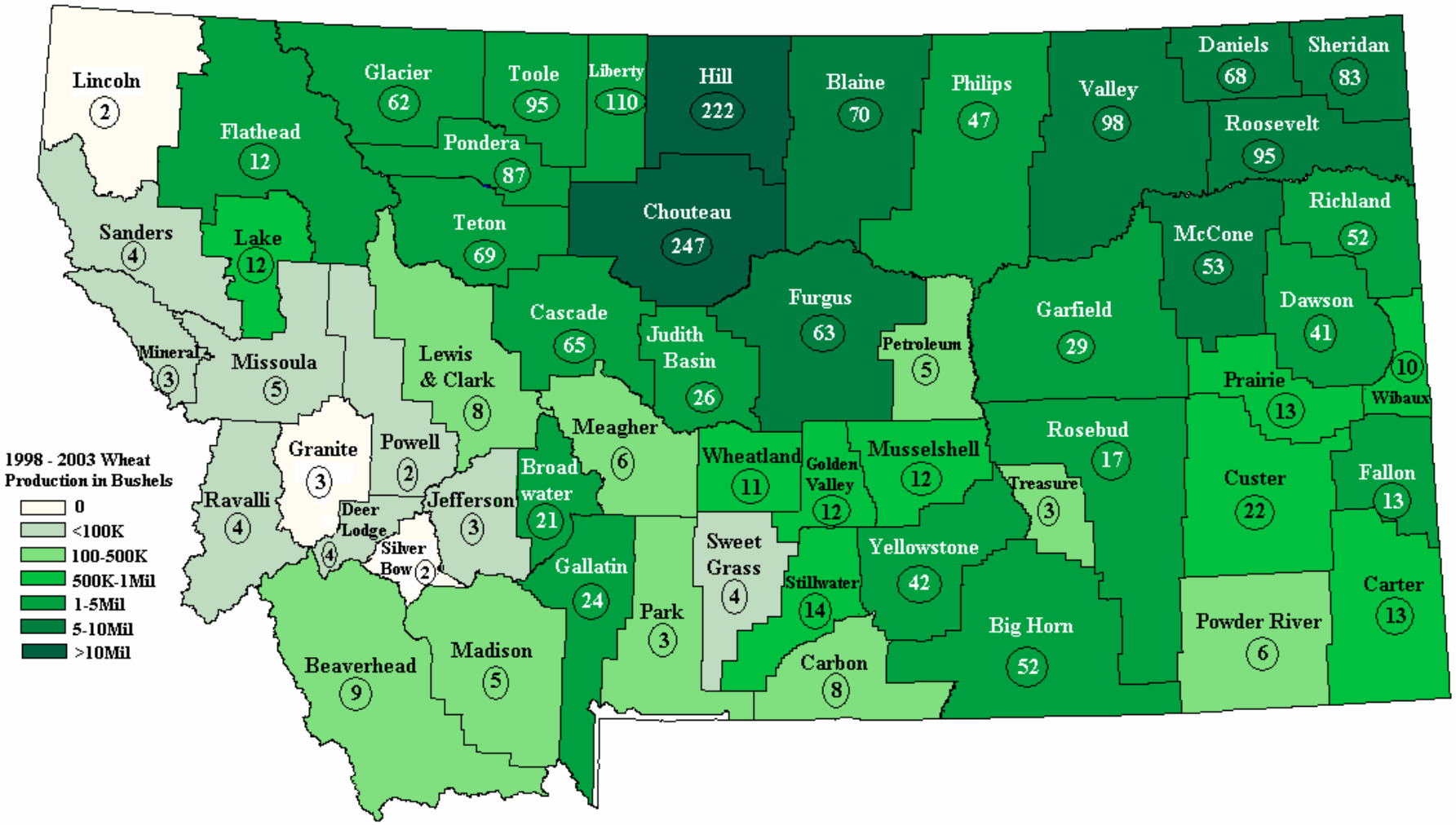
SOURCE: Economic Research Service U.S. Agricultural Trade Update, June 2004



The Montana portion of the USDA Karnal Bunt Survey was performed by the MDA July through September 2004. A total of 118 samples from 34 counties were collected. Sample collection density ranged from one per county to thirteen in the largest wheat-producing county. All test results were negative for Karnal bunt.

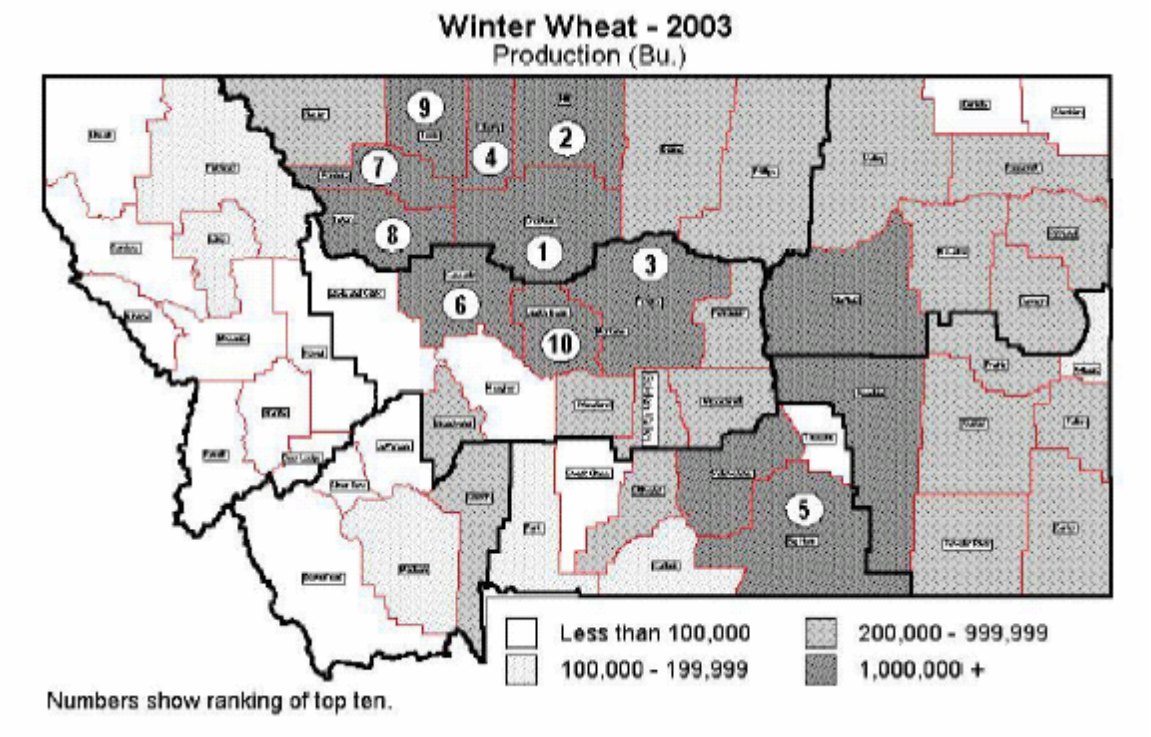
Wheat test analysis data for Karnal bunt received from the Montana Karnal Bunt Survey were processed and results were entered into NAPIS by the United States Department of Agriculture in Olney, Texas.

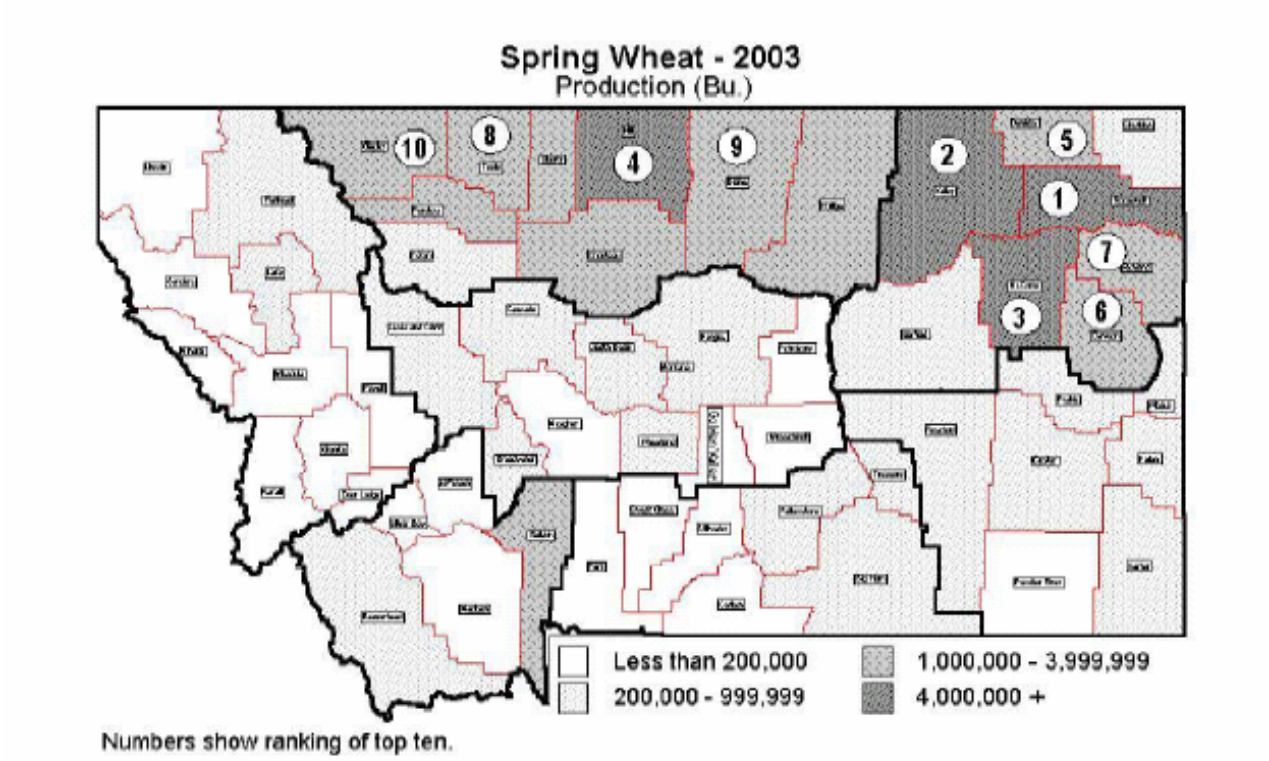
Number of Karnal Bunt Samples per County, 1996 - 2004
Compared to Average Wheat Production, 1998 - 2003

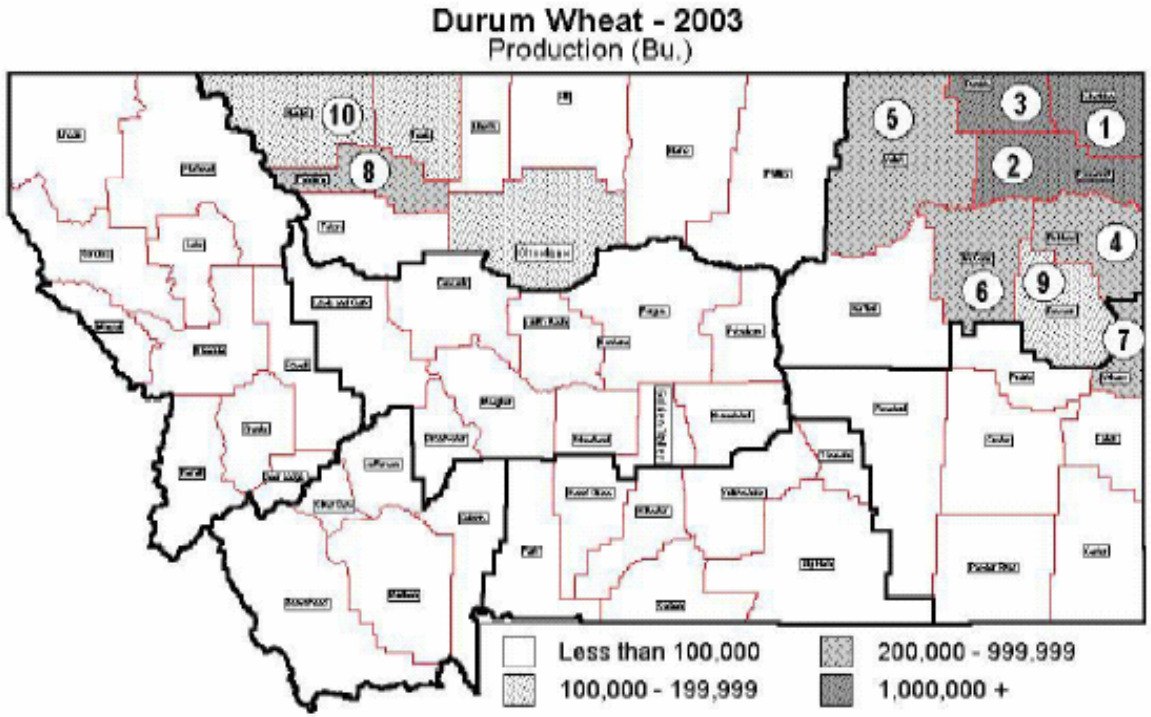


Karnal Bunt Samples - 1996 through 2004											6 Year Average Production
County	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total # Samples	1998 through 2003
Granite	0	1	0	0	1	0	1	0	0	3	0
Lincoln	0	1	0	0	0	0	1	0	0	2	0
Silver Bow	1	1	0	0	0	0	0	0	0	2	0
Deer Lodge	1	1	0	0	1	0	1	0	0	4	5,500
Powell	1	1	0	0	0	0	0	0	0	2	8,333
Mineral	1	1	0	0	0	0	1	0	0	3	34,833
Sanders	1	1	0	1	0	1	0	0	0	4	43,000
Sweet Grass	1	1	0	1	0	1	0	0	0	4	55,500
Ravalli	1	1	0	1	0	1	0	0	0	4	60,167
Jefferson	1	1	0	0	0	0	1	0	0	3	68,500
Missoula	1	1	1	1	0	1	0	0	0	5	84,333
Carbon	3	3	0	1	0	1	0	0	0	8	206,333
Meagher	2	2	0	0	1	0	1	0	0	6	242,000
Park	1	2	0	0	0	0	0	0	0	3	251,167
Treasure	1	2	0	0	0	0	0	0	0	3	264,833
Petroleum	1	3	0	0	0	1	0	0	0	5	364,333
Lewis & Clark	2	4	0	0	1	0	1	0	0	8	378,667
Madison	1	3	0	0	0	1	0	0	0	5	418,000
Powder River	2	4	0	0	0	0	0	0	0	6	456,333
Beaverhead	2	3	1	1	1	1	0	0	0	9	462,333
Golden Valley	3	5	1	0	1	0	1	0	1	12	549,500
Stillwater	4	7	1	1	0	1	0	0	0	14	608,667
Lake	3	5	1	0	1	0	1	0	1	12	616,833
Custer	3	5	4	2	3	2	2	0	1	22	632,833
Musselshell	3	5	1	1	0	1	0	0	1	12	689,000
Carter	3	5	1	1	0	1	1	0	1	13	784,333
Prairie	2	6	1	1	0	1	1	0	1	13	794,833
Wheatland	4	5	1	0	0	0	1	0	0	11	805,667
Wibaux	2	7	0	0	0	0	0	0	1	10	965,000
Fallon	2	7	0	1	0	1	0	1	1	13	1,126,167
Flathead	3	4	1	1	0	1	0	1	1	12	1,217,833
Rosebud	6	8	0	0	1	0	0	1	1	17	1,367,333
Broadwater	7	8	1	0	1	0	1	1	2	21	1,505,333

											6 Year Average Production
County	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total # Samples	1998 through 2003
Yellowstone	11	14	5	2	2	3	2	2	1	42	2,005,833
Judith Basin	6	10	2	1	1	1	1	2	2	26	2,047,167
Garfield	6	13	2	1	1	1	1	2	2	29	2,126,333
Gallatin	6	10	1	1	1	1	0	2	2	24	2,375,333
Glacier	17	25	5	2	3	2	3	2	3	62	2,505,000
Big Horn	18	19	3	1	2	1	2	3	3	52	3,269,667
Phillips	17	15	3	2	1	2	1	3	3	47	3,461,333
Teton	17	26	7	4	3	4	3	3	2	69	3,768,333
Cascade	19	23	5	3	2	3	2	4	4	65	4,082,333
Dawson	5	21	3	2	1	1	1	3	4	41	4,288,833
Toole	28	36	8	4	4	4	4	4	3	95	4,297,667
Pondera	23	30	9	4	5	4	4	4	4	87	4,347,667
Richland	10	23	4	2	2	1	2	4	4	52	4,470,333
Liberty	34	38	10	5	5	4	5	4	5	110	4,641,833
Blaine	23	25	4	2	2	2	2	5	5	70	5,021,333
Fergus	17	21	5	2	3	2	3	5	5	63	5,069,833
McCone	6	25	4	2	2	2	2	5	5	53	5,479,167
Daniels	17	30	3	1	2	1	2	6	6	68	6,239,667
Valley	28	34	8	4	4	4	4	7	5	98	7,569,333
Sheridan	22	34	4	2	2	2	2	8	7	83	8,496,833
Roosevelt	23	36	7	3	4	3	4	8	7	95	8,736,667
Hill	72	72	19	10	9	10	9	10	11	222	11,045,000
Chouteau	74	81	22	11	12	11	11	12	13	247	13,261,500
TOTALS	568	775	158	85	85	85	85	112	118	2071	133,674,500


Winter Wheat - 2003
Production (Bu.)
9
2
4
7
8
1
3
6
10
5
Less than 100,000
100,000 - 199,999
200,000 - 999,999
1,000,000 +
Numbers show ranking of top ten.


Spring Wheat - 2003
Production (Bu.)
10
8
4
9
2
5
1
7
3
6
Less than 200,000
200,000 - 999,999
1,000,000 - 3,999,999
4,000,000 +
Numbers show ranking of top ten.



Numbers show ranking of top ten.

Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program
Cereal Leaf Beetle Survey Report
2004

Compiled by Patricia Denke

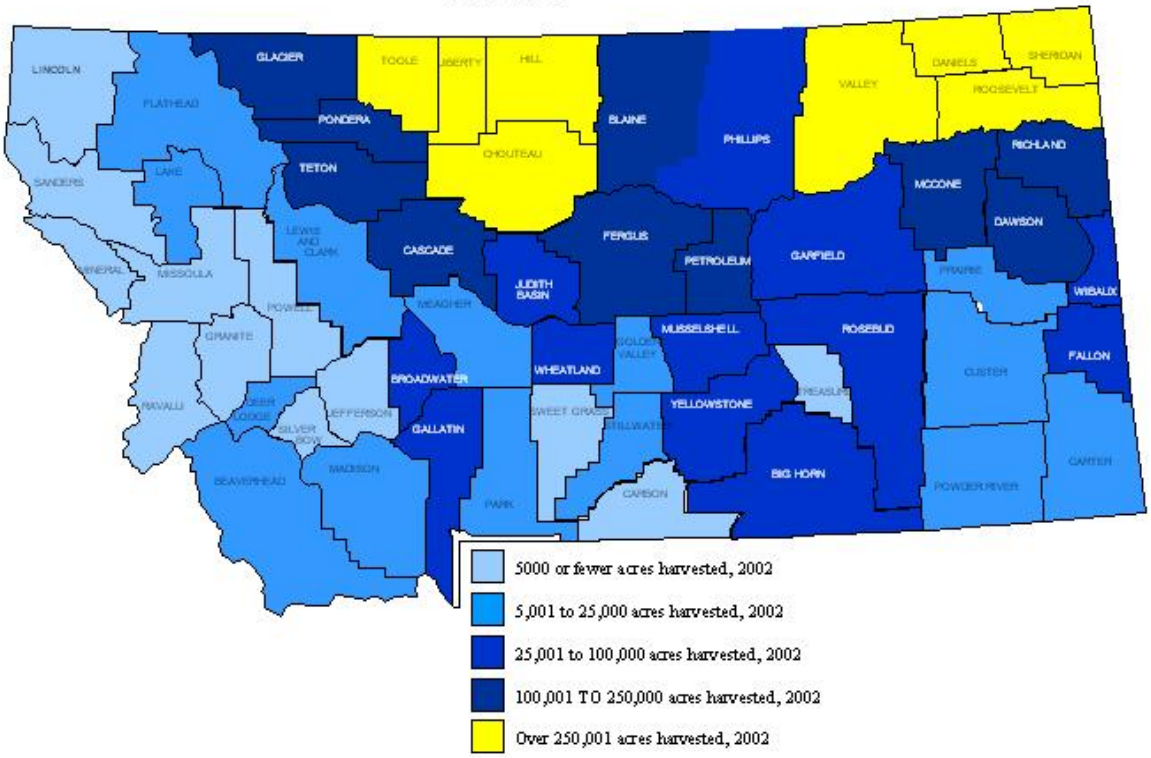
Cereal leaf beetle (*Oulema melanopus* (L.) (CLB) continued to spread in Montana in 2004. Sampling was conducted in all counties not previously known to be infested with CLB. This included Glacier, Toole, Liberty, Hill, Blaine, Phillips, Daniels, Sheridan, Roosevelt, Wibaux, Fallon, and Wheatland Counties, in addition to Pondera County, which was not known to have established populations of the CLB. Several additional counties were sampled as part of the effort to determine distribution of the parasitoid *Tetrastichus julis*. These included Lincoln, Flathead, Sanders, Mineral, Missoula, Lake, Ravalli, Glacier, Jefferson, Lewis & Clark, Meagher, Broadwater, Gallatin, Stillwater, Carbon, Yellowstone, Big Horn, Rosebud, Garfield, McCone, Richland, Custer, and Carter Counties.

Three tours of sweep sampling were conducted in the non-infested counties. Three adult CLB were collected in Wheatland County (500 sweeps). No beetles were collected in Glacier County, but 21 larvae were collected in a single location in Toole County (500 sweeps). There were no positive samples from any of the remaining non-infested counties. In addition, despite repeated sampling, CLB was not found in the Glacier County site where a single adult beetle was found in 2003. CLB was also not found during repeated sampling of a Pondera County site where parasitoids were released in 2003.

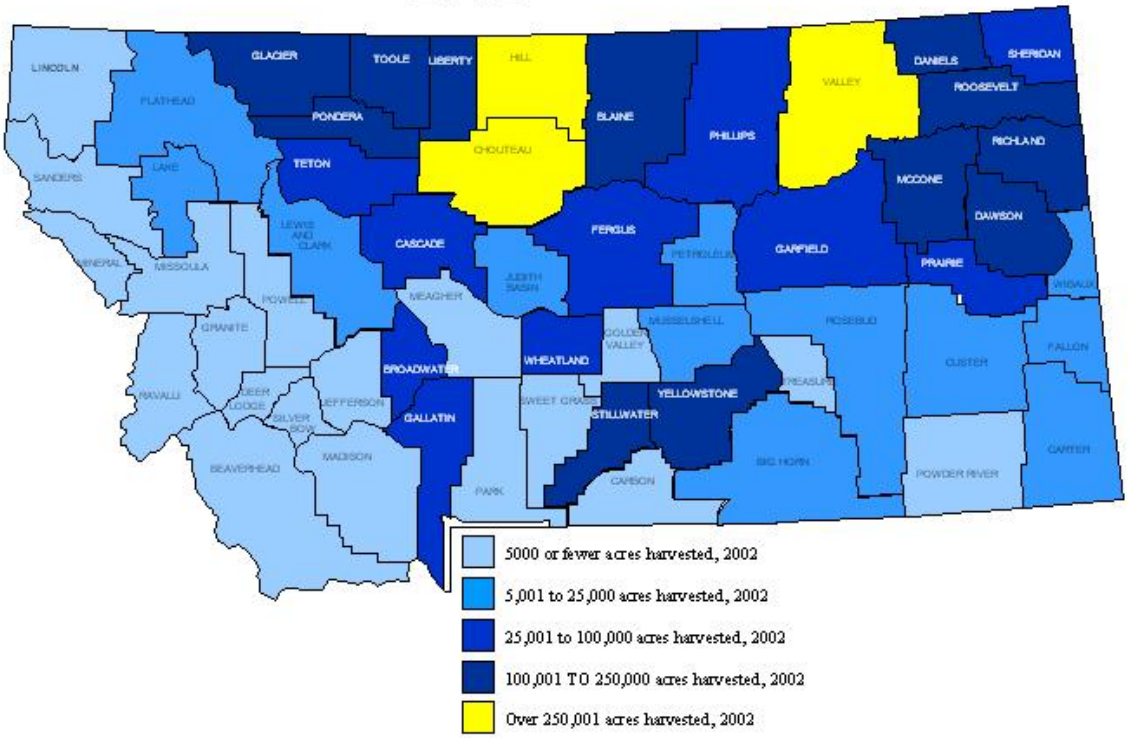
The known distribution of CLB is now very near the area known as the Golden Triangle. This area is described as Great Falls north to Cut Bank, and east to Havre and includes all or parts of Toole, Liberty, Hill, Chouteau, Cascade, and Pondera Counties. The majority of Montana's grain crop is produced in the Golden Triangle. Although this area is primarily devoted to dry-land agriculture, which reduces the successful establishment of CLB, it contains some irrigated acreage devoted to high value crops such as malting barley. As a rule, the arid conditions found in most dryland fields cause the egg and larvae of CLB to dry out. However, under favorable weather conditions, this pest has done significant damage to dryland crops.

Malting barley can be especially hard-hit by CLB, because while feeding damage may not reduce yields, it may cause the character of the grain to change, rendering it unacceptable to the malting industry. Also important are the various export restrictions and requirements that have to be met once a county has been found infested with CLB.

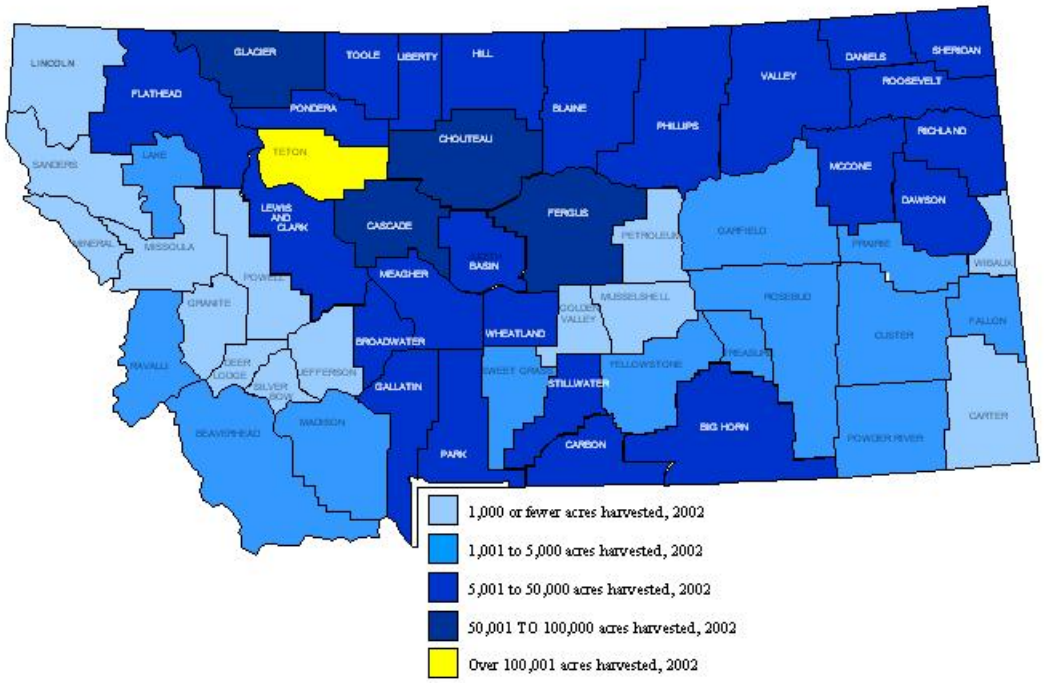
Harvested Acres of All Types of Wheat 2002



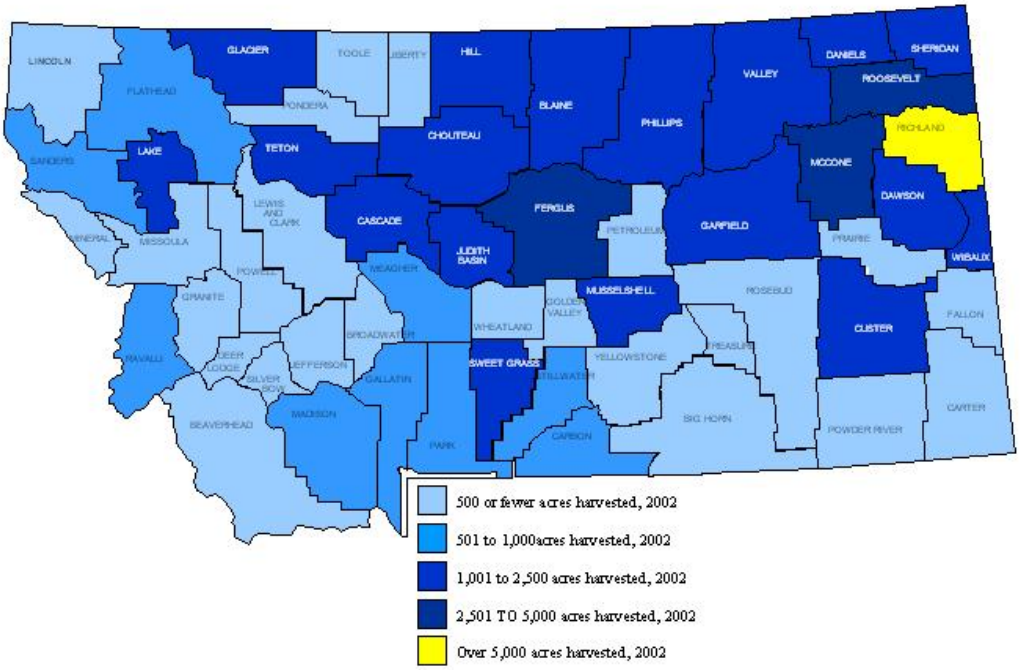
Harvested Acres of Spring Wheat 2002



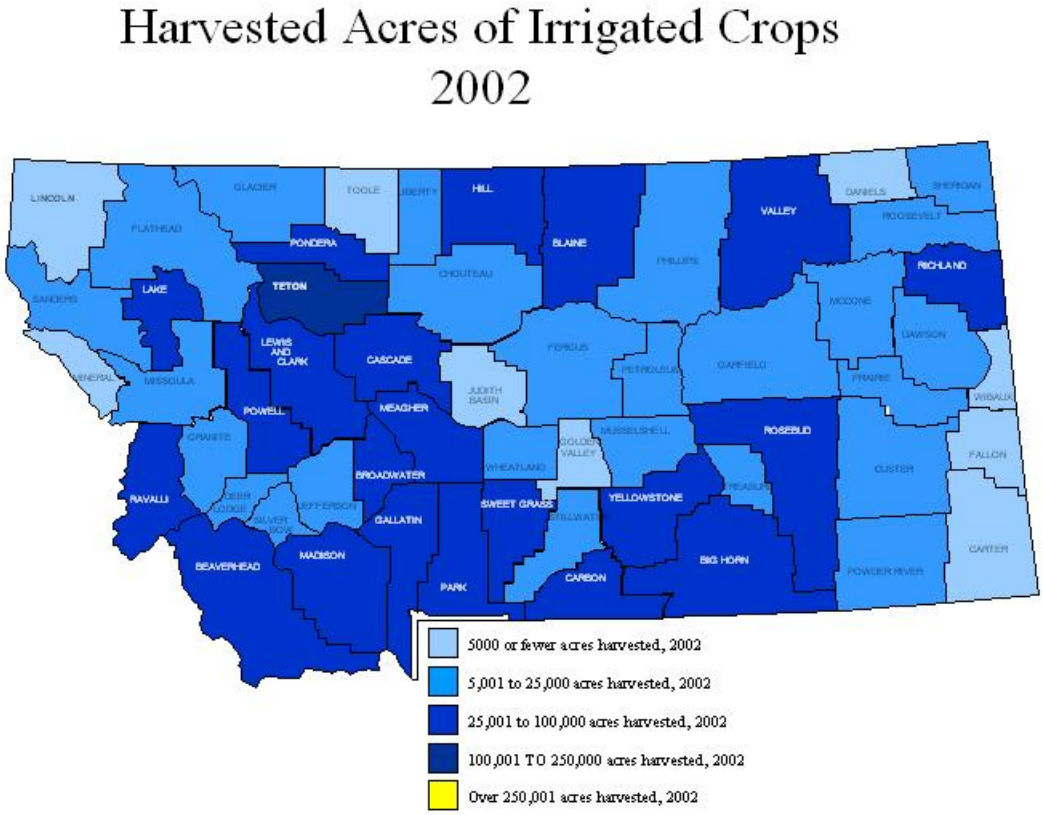
Harvested Acres of Barley
2002



Harvested Acres of Oats
2002



The areas most at risk from CLB are areas where large quantities of grain are grown and areas where large acreages are devoted to the crops preferred by the beetle, including oats, barley and spring wheat. Also increasing the risk for establishment of CLB, and development of large populations, is the existence of irrigated agriculture. Although many Montana counties have significant acreages in production of cereal grains, irrigated acres are also used in the production of such commodities as seed potatoes, sugar beets, and various forages. Most of the highest risk CLB establishment areas have already been infested (southern portion of the state). However, Hill, Blaine and Valley counties may be at higher risk than the other High-line counties due to the presence of large amounts of irrigated ground. It may be advisable in the future to add additional sampling to these counties.



During 2004, development of an information card was also started. This card is shirt-pocket sized, with a picture and description of the beetle and its damage. The reverse side provides contact information for the MDA, and pictures of two other beetles that are commonly mistaken for the CLB. A three-fold brochure has also been developed, detailing the history, biology, and economic impact of the beetle. Cooperative Agriculture Pest Survey Intern Kathy Wiegand developed this brochure during her tenure with the MDA.

Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program
Cereal Leaf Beetle Biological Control Report
2004

Compiled by Patricia Denke

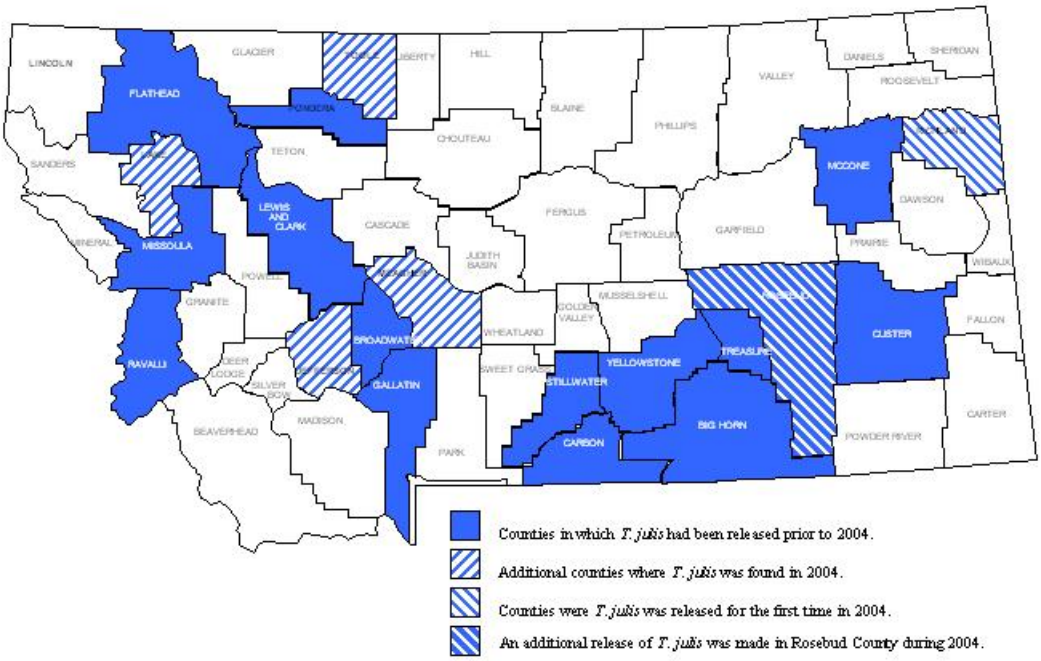
At least three cereal leaf beetle (CLB) (*Oulema melanopus* (L.)) parasitoids have been introduced to Montana: *Tetrastichus julis* (Walker), *Anaphes flavipes* (Foerster), and *Diaparsis temporalis* Horstmann (*Lemophagus curtis* Townes). At least two of these, *T. julis*, and *A. flavipes*, have been recovered in the state in previous years. Continued efforts by both the MDA and APHIS personnel have resulted in additional distribution of *T. julis* throughout areas with the CLB, as well as to other states in the region.

During 2004, an informal, somewhat sequentially planted area of CLB host crops was continued in Lake County, Montana in an effort to create an area where the parasitoids could be reliably collected for subsequent re-distribution efforts. However, parasitoid levels are not necessarily any higher in the "insectary" area than in surrounding fields, and indeed, may be lower than in other areas. It may be a more reliable and economically feasible alternative to collect CLB larvae from areas with high population densities, determine if parasitoid levels are high enough to justify using that population as a source, and proceed from that point, than continue to maintain a formal insectary. A major difficulty has been getting the insectary planted with the appropriate plants at the appropriate times, and having subsequent levels of CLB to continue the process.

In Montana, CLB is not a predictable pest. It appears that desiccation during the larval stage can have a major impact on larval survival. Informal experiments indicate that larvae held without water can survive up to four days on plant foliage, but that the fecal material on their backs appeared dry and shrunken. Upon application of water, the larvae moved to water droplets, apparently taking in the water, and the fecal packets, which had a dull, sunken appearance, rapidly became larger and shiny.

In the past, *T. julis* has been found in nine Montana counties. It was released by USDA APHIS, the MDA, and MSU personnel in at least six additional counties in subsequent years. During 2004, survey work was conducted to attempt to determine the extent of *T. julis* establishment in the state, and limited re-distribution of the parasitoid took place. Sweeps were taken in Lincoln, Flathead, Sanders, Mineral, Missoula, Lake, Ravalli, Glacier, Jefferson, Lewis & Clark, Meagher, Broadwater, Gallatin, Stillwater, Carbon, Yellowstone, Big Horn, Rosebud, Garfield, McCone, Richland, Custer, and Carter Counties. However, not all sweeps contained CLB larvae, and not all samples that contained CLB larvae survived for dissection. Releases with at least 2000 larvae (estimated infestation rate approximately 80%) were made in Pondera, Richland and Rosebud counties by MDA personnel.

Release and recovery of *Tetrasticlus julis* in Montana
2004



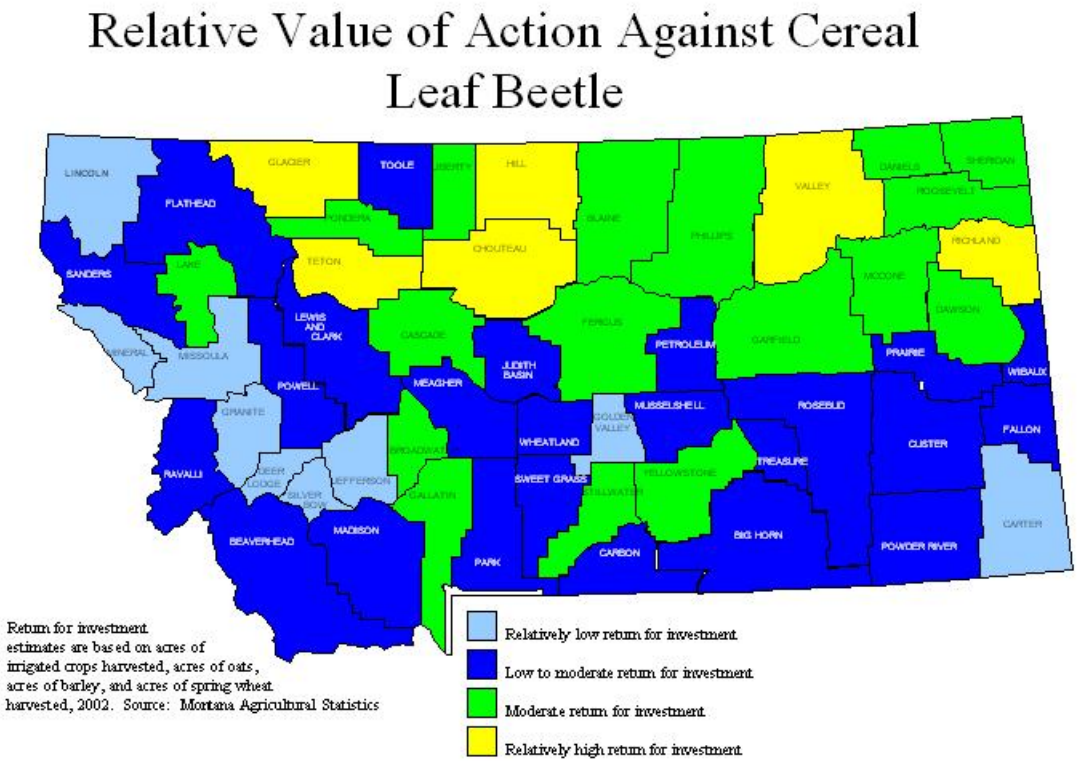
Larvae were collected from 26 sites in 13 counties. In all but two of these counties (Richland and Rosebud counties), *T. julis* was found in at least one larva. Infestation levels ranged from 0% (Richland County) to 100% infested (Stillwater County).

Levels of infestation by *T. julis* in CLB in various Montana counties, 2004. Collections made by MDA personnel.

County	Date (2004)	GPS location	CLB collected	*T. julis* level Percent specimens infested	No. *T. julis* / CLB (range)
Lake County (Insectary)	24 May		22	0	--
Lake County	2 June		70	5	1-5
Lake County	16 July		42	48	1-15
Broadwater County	23 June	Countywide	270	44.67	1-10
Carbon County	16 July	Countywide	12	83	1-10
Toole County	28 June	48°26.885N 111°58.173W	21	81	1-10
Meagher County	14 July	Countywide	17	18	1-10
Jefferson County	24 June	45°52.748N 112°58.369W	100	35	1-15
Gallatin County	28 June	45°40.267N 111°00.5W	2	50	3
Custer County	16 July	Countywide	6	67	1-10
Ravalli	29 June	Countywide	30	73	1-10
Missoula	30 June	Countywide	18	20	1-10
Yellowstone County	8 June	Countywide	100	29	1-7
Flathead County	16 June	Countywide	30	56	1-7
Stillwater County	16 July	Countywide	4	100	1-10
Rosebud County	10 June	Countywide	50	0	--
Yellowstone County	14 June	Countywide	90	10	1-6
Lewis & Clark County	22 June	46°39.118N 111° 53.631W	90	33	1-11
Lewis & Clark County	22 June	46°36.154N 111° 51.081W	90	54	unknown

There are very finite resources available for these efforts, and maximizing the outcome is essential. Therefore, the relative risk to cereals in a county and the current level of parasitoid activity in an area need to guide our efforts in the future. The relative risk to cereals in an area will be created, in part, by the plant population, certain cereals are at higher risk due to insect preference. Other cereals have a higher dollar value, which puts control of the beetle in a higher need category.

In addition, the presence or absence of irrigated agriculture, where many of the higher preference, higher dollar value crops are grown, puts a county into a higher risk category, and therefore, if infested, into a higher need category for the parasitoids. In addition, there is evidence that the presence of water in an area (irrigation) creates a higher risk for successful establishment of damaging populations of the beetle, creating a higher need for both monitoring and control measures.



Non-irrigated counties, with low acreages of crops such as barley, oats, and spring wheat, are at much lower risk of development of economic levels of CLB. In addition, the economic value of action against CLB under those circumstances is not as high as under other conditions.

Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program
Woodborers Survey Report
2004

Compiled by Patricia Denke

Phase I. Information Gathering and Theoretical Risk Assessment

Montana is at risk for invasion by exotic wood boring beetles, including Emerald Ash Borer (*Agrilus planipennis*) (EAB), Banded Elm Bark Beetle (*Scolytus schevyrewi*) (BEBB), and the Asian Long Horned Beetle (*Anoplophora glabripennis*) (ALB). All of these pests are commonly moved through the transportation of wood and wood products. While there are not any large facilities that collect solid wood packing materials in the state, any area that has wooden pallets, braces, or other materials, stored for a time period that includes the emergence time for one of these pests, must be considered a possible point source of the pest. Unfortunately, while these woodpiles can be inspected for exit holes, without having an actual specimen in hand it is often not possible to determine what species of insect made the hole.

At the beginning of this survey, none of these beetles were known to occur in Montana. The EAB is a pest of various species of ash (*Fraxinus*); the BEBB feeds on a wide variety of trees and shrubs, including Siberian Elm (*Ulmus pumila*), willow (*Salix* spp), pea shrubs (*Caragana*), Russian olive (*Eleagnus angustifolia*), and various members of the genus *Prunus* (plums and cherries). The ALB is also a polyphagous insect, feeding on maples, horse chestnuts, poplars (*Populus*), willows (*Salix* spp.), elms (*Ulmus* spp), mulberries, and black locust. All of these trees occur at some level in the state. Some occur naturally, such as green ash (*F. pennsylvanica*), various willows, and *Prunus*. Many of the others have been used as landscape trees in Montana towns. As a result, any extensively landscaped areas are at higher risk for infestation and subsequent economic damage by these pests.

Because EAB has been documented to move in nursery stock, a telephone survey of nurseries in 7 Montana cities was conducted. Of the nurseries contacted, 57% start their own green ash from seeds, 28% get their stock from Oregon, and the remaining 15% get their green ash from Minnesota.

Tree and shrub species in Montana, their prevalence, and their risk from emerald ash borer, banded elm bark beetle, and Asian long horned beetle.

Plant Species	Emerald Ash Borer	Banded Elm Bark Beetle	Asian Long horned Beetle	Prevalence in State of Plant Species
Ash	x			High
Elm		x	x	High*
Willow		x	x	High
Pea Shrub		x		High
Russian Olive		x		High
Prunus		x		High
Maple			x	Medium
Horse Chestnut			x	Low

Poplar			x	High
Mulberry			x	Low
Black Locust			x	Low**

*Far more Siberian elm than American elm.
**Concentrated in specific areas, particularly Billings.
Source: Web pages for various cities, Dr. Bob Gough, MSU Extension Horticulture.

Current Infestations and Relative Risks:

The actual risk posed by any of these pests to trees in Montana should be addressed in a scientific fashion. The perception of risk in the minds of the pubic is based, in part, on the knowledge they have of the danger, as well as the trust they have in the systems that are in place to protect them. Actual risk is the likelihood of an event occurring, in this case, the establishment of populations of these particular wood-boring beetles in Montana. At present, all three exist in established populations within the United States, which increases the risk from what it would be if they were not known to occur on this continent. In order to further assess the relative risk of movement into Montana, and establishment of populations in Montana, it is necessary to know how the pests travel, where they are being transported from, details of their life cycle and host range, and information about similar native insects.

Locations of current or historical infestations of Banded Elm Bark Beetle, Emerald Ash Borer and Asian Long Horned Beetle. Includes states that collected specimens in 2004, but are not known to have established populations.

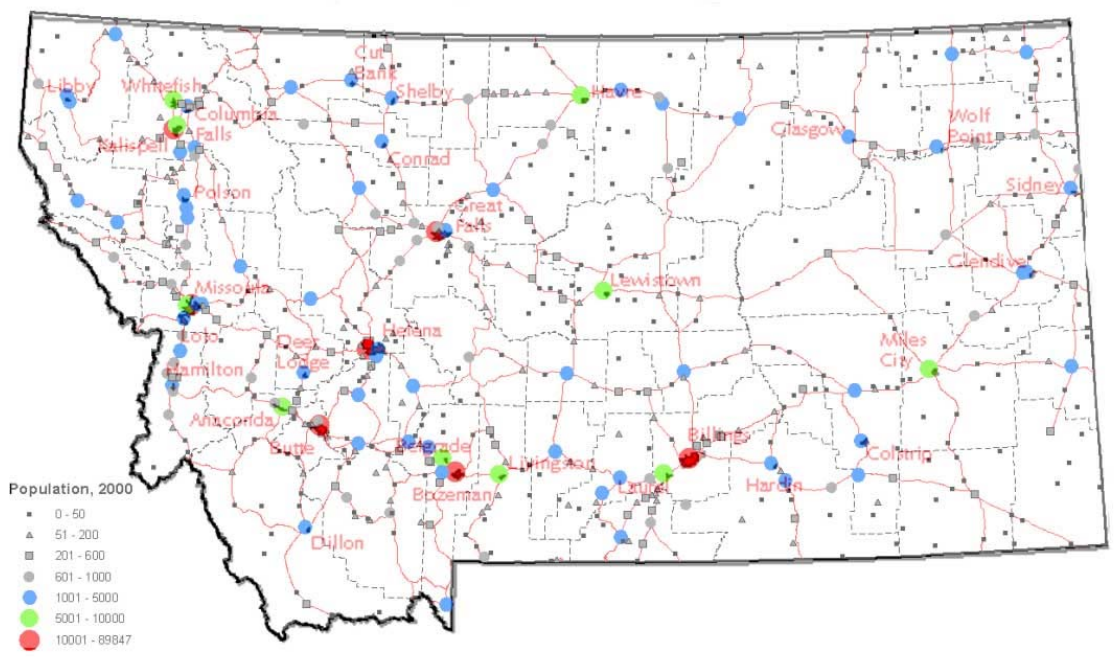
Infested State (Includes any state where the insect has been found) (NAPIS)	Banded Elm Bark Beetle	Emerald Ash Borer	Asian Long horned Beetle
Arizona	x		
Colorado	x		
Connecticut			x
Idaho	x		
Illinois	x		x
Indiana	x	x	
Kansas	x		
Maryland	x	x	
Michigan	x	x	x
Montana	x		
Nebraska	x		
Nevada	x		
New York			x
Ohio		x	
Oregon	x		
South Dakota	x		
Utah	x		
Vermont		x	
Virginia	x	x	
Wyoming	x		

It is thought that all three of these pests spread through the transportation of infested wood, particularly solid wood packing materials. A higher population of humans will result in a larger volume of shipping entering an area. This in turn translates into a higher volume of wood packing, and a higher risk of importation of pests in that wood. There are 7 cities in Montana with an estimated population of over 10,000. These cities should be considered as the areas with the highest risk of infestation by any of these beetles.

Estimated populations of cities in Montana with populations of more than 10,000.

Estimated Population (July 2003) of 7 Largest Montana Cities	
City	Population
Billings	95,220
Missoula	60,722
Great Falls	56,155
Butte-Silver Bow	32,519
Bozeman	30,753
Helena	26,718
Kalispell	16,391

Major population centers in Montana, by 2000 census.



Because these cities have the highest risk of infestation, they should be the focus of surveillance efforts. These cities also have a higher risk for damage by the pests should they by introduced, due to landscaping efforts that are more likely to include the various host plants, and because of the possibility of trees living in nominal conditions, increasing their susceptibility to the pests.

All three of these pests were apparently native to Asia. There is a very large amount of shipping from Mainland China to the US, much of which arrives packed or braced in wooden material. Apparently, at some time, some of these wooden packing materials contained viable specimens of the beetles, probably as late instar larvae or pupae, in sufficient numbers that populations were able to establish.

Different types of transported materials are more likely to be packed in solid wood packing material, with various large pieces of wood that might contain these insects. These include large machines, which

frequently are transported in sections, with bracing to hold the various sections in place and with large blocks of wood protecting various portions of the machine from damage as well as preventing movement. Chemicals and electrical equipment, as well as various other types of small materials are frequently packed into boxes or crates, and may also be placed on wooden pallets. Although these pallets may be made of wood grown in the U. S., once a pest has become established in areas, these are also potential sources of infestation for other areas. While larger pieces of wood, such as blocks and planks certainly hold a larger risk, smaller boards can also contain insects. In a Canadian study, 24% of the wooden spools examined contained live insect larvae, while 31% contained evidence of insect activity in the recent past.

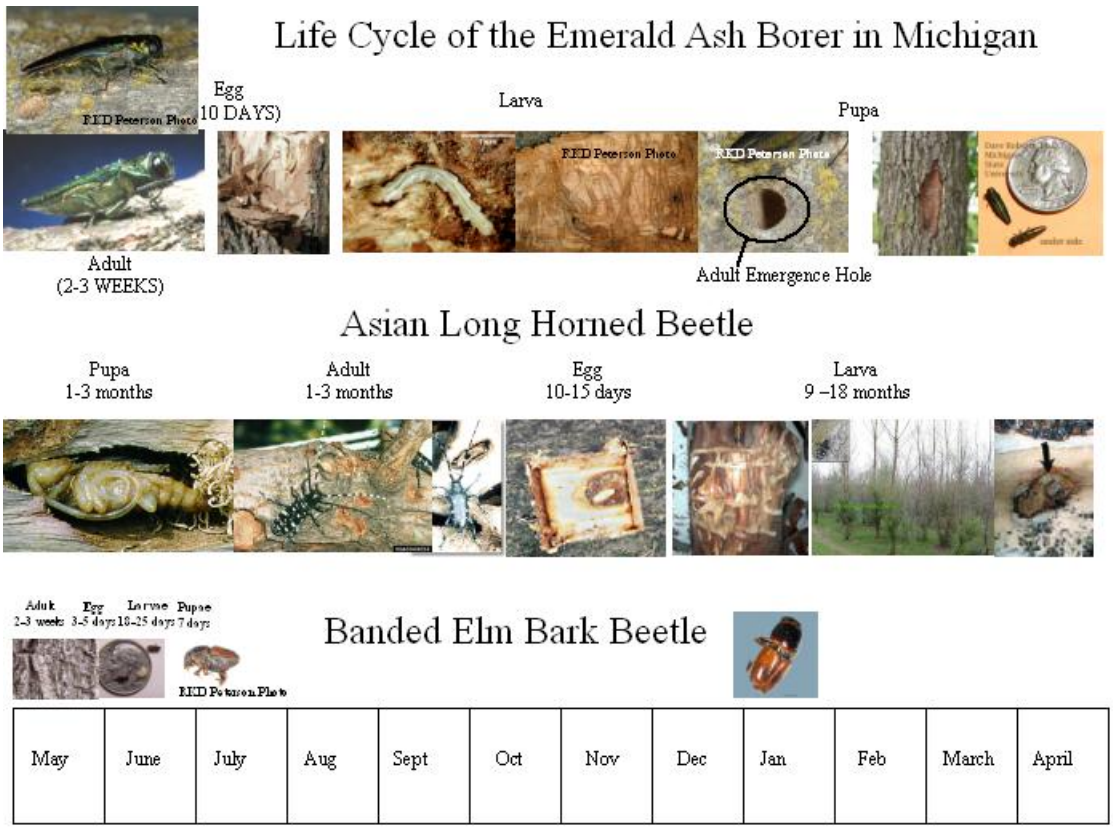
Top exports from states with known infestations of BEBB, EAB, and ALB.

	Top Five Exports from State (in U. S. $, not ordered)*				
Colorado	Scientific Instruments	Transportation Equipment	Machinery	Chemicals	Mining
Illinois	Machinery	Chemicals	Electrical Equipment	Metal Products	Agriculture
Indiana	Vehicles	Machinery	Electrical Machinery	Medical Equipment	Organic Chemicals & Plastics
Michigan	Vehicles & Parts	Industrial Machines	Computers	Electronics	Plastics & Instruments, Optics
Nevada	Mining	Agriculture	Machinery	Electrical Equipment	
New York	Machinery	Scientific Instruments	Electrical Equipment	Chemicals	Agriculture
Ohio	Agriculture	Transportation Equipment	Metal Products	Machinery	Electrical Equipment
Oregon	Machinery	Scientific Instruments	Paper Products	Agriculture	
South Dakota	Agricultural Products	Mining	Industrial Machines	Electronics	Medical Products
Utah	Machinery	Mining	Electrical Equipment	Agriculture	
Virginia	Transportation Equipment	Chemicals	Electrical Equipment	Agriculture	textiles
Wyoming	Mining	Agriculture	Chemicals	Machinery	Scientific Instruments

*Primary Source: http://www.50states.com, copywriter 2004 Pike Street Industries, Inc.

Life cycle and Host Range:

All three insects spend a considerable length of time concealed within the wood of the tree. As a rule, the immatures are the over-wintering stage, although in the case of the BEBB, adults may also overwinter. EAB and ALB both have at least one-year life cycles, with the ALB apparently having a two-year cycle on occasion. Other members of the same family as the ALB (Cerambycidae) have been known to diapause for over 10 years, creating unique risks of long-term existence of hidden populations.



Emerald Ash Borer: This insect has a one-year life cycle. The adult is generally present for a short period of time during late May, the egg stage lasts about 1 week, and the larval stage over-winters, lasting from 8-10 months. Larvae are white, have distinct segmentation, and are long, and relatively slender. The head and body are about the same size. The pupal stage is short, from April to May, after which the adults emerge. Adults are relatively short-lived, having a life span of 2-3 weeks. The adults are the strongest fliers of this group, but still don't move as much as some other insects.

This insect is currently confined to several states in the eastern half of the U. S., and Canada. The actual extent of the infestation is not well known. As a result, it is also not known if the insect is spreading, or if eradication efforts will be successful. This insect poses a very real threat to Montana. The phenology of the insect is synchronized with the phenology of our ash populations. While Montana is in the historical range of only a single species of ash, the genus has been used extensively in many Montana cities and towns as a landscape tree because it grows relatively rapidly, is tolerant of adverse conditions, and has excellent aesthetic properties. EAB is a greater danger to trees growing under adverse conditions, which makes most Montana ash high-risk trees, especially during drought conditions. The risk of transportation is higher if the wood materials are cut and moved during the later portion of the winter, because the insects are in later larval stages or pupating.

Similar Insects: There are several other insects that are at least superficially similar to the EAB. The Bronze Birch Borer (*Agrilus anxius* Gory) infests most, if not all, species of birch (*Betula* spp.). Other insects that bore in ash include a number of clearwing borers (Lepidoptera: Sesiidae).

Banded Elm Bark Beetle: This insect has a very short life cycle relative to the other two species, from 45-50 days at the shortest. The females feed for a short period of time on the bark near branch crotches prior to mating and oviposition. Each female can lay 35 to 90 eggs, with an average of 60 eggs per female. The egg stage generally lasts from 3-5 days. The eggs are laid in individual galleries, located off the sides of a longer oviposition gallery. The larval stage lasts from 18 to 25 days, during which the insect

goes through 5 larval instars. Larvae are white, with relatively large bodies compared to their heads. The pupal stage lasts about 1 week. While the adults will oviposit into the same tree they emerged from, they are also capable of flight. Overwintering is usually in the larval stage, although newly emerged adults may also overwinter in galleries just under the bark. Trees with a diameter of greater than 5 cm are more likely to be infested, but smaller trees may also be infested. In addition, the beetles are more likely to infest weakened trees, and may oviposit and develop in newly felled trees. This is a relatively small beetle, which means that dispersal via wind is also a possibility.

The extent of the infestation of this insect in the United States is unknown. It has been found in several western states, including Colorado and New Mexico. The larvae can develop in a wide range of hosts, making it easy for the insect to find contiguous host populations. A large number of hosts are found in Montana, including Caragana, Elm, various willows, *Prunus* spp., and Russian olive. In fact, most of these species are used as landscape trees, as well as in windbreaks. Elm, willow, and Russian olives are often found in wild populations throughout the state, particularly in areas with adequate water. However, under drought conditions, even these areas can be affected, and trees in them will be stressed. Many of the Russian olive populations are in saline areas, so the trees may be under additional stress. The insect is likely to be able to complete at least two generations per year in Montana, and may be able to complete a partial third generation. In fact, with recent warming trends, there is potential for four generations under certain circumstances in parts of Montana. This may lead to rapid adjustment of the insect's phenology to Montana conditions.

It must be kept in mind however, that the true impact of this insect is unknown. At present, it has been found in many parts of the United States. The total host range in the U.S. is not known, and the impact of the beetles on the various hosts, even in their native range, is not well understood.

Similar insects: There are a number of other beetles in the same family as the BEBB that also impact elm. The main one is *Scolytus multistriatus*, the primary vector of Dutch elm disease. All of these beetles are very similar in appearance and life cycle, making it essential to consult an entomologist to differentiate the insects. However, there are some excellent materials becoming available, particularly in the form of keys incorporating photographs of essential characteristics. (e.g., the key found at http://ceris.purdue.edu/napis/pests/barkb/schevy/schevyrewi_ID_new1A.pdf).

Asian Long Horned Beetle: This is a relatively large insect, with a wide size range; from under one inch to over three inches, depending on sex, and larval diet. This size is also determined, in part, by the length of time the insect spends as an immature. Adult ALB emerge over a long period of time, perhaps due to sexual differences, or overlap of one and two year life cycles. The larval stage is the over-wintering stage, but may extend over a second winter, leading to a two-year life cycle. Larvae have distinctly larger heads, and are white. Pupation is relatively short, after which the adults emerge and feed on leaves of the various host trees. Adults can live several months. A female can lay from 35 to 90 eggs in galleries they create under the bark. Each egg is deposited in an individual gallery. The egg stage lasts from 10 to 15 days, after which the larvae tunnel randomly throughout the tree, creating relatively large galleries.

The extent of this insect's establishment in the United States is unknown. At present, eradication efforts are underway in several areas in the eastern U.S. It has a wide host range, with several widely used landscape trees, as well as some natives, that can be utilized. While *Populus* is indicated as a host, it is unclear if the species included in this designation include the native cottonwoods found in Montana or not, and indeed, it may be unknown. If it can develop in these hosts, it poses a much larger threat to Montana than would be apparent from other data. However, it may also be related closely enough to the native borers that their parasitoids and predators could rapidly adapt to utilize this source of food.

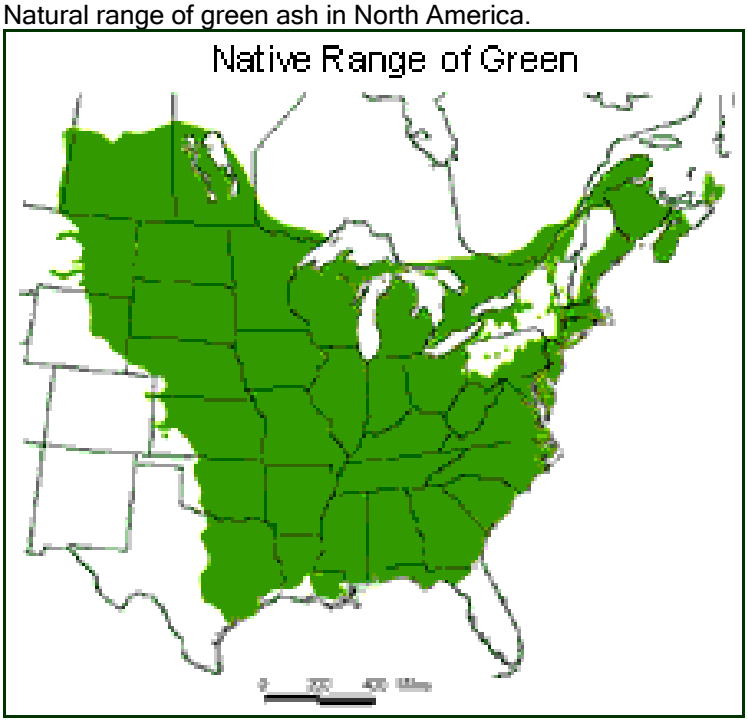
Similar Insects: There are several similar insects found in Montana. The most prevalent is the Pine sawyer, *Monochamus* spp., although the poplar borer, *Salperda* spp., also occurs in the state. In addition to having these long horned beetles, there are a number of insects that create similar damage, including pigeon tremex and carpenter moths (Lepidoptera: Cossidae).

Phase II Sampling and Information Dissemination

The current extent and distribution of the ALB populations in the United States indicate that this insect is a very limited threat to Montana. In addition, successful completion of the life cycle of this insect depends on the existence of fairly large diameter trees, which means that it may be possible to control its spread through removal or treatment of all trees of certain species and size in infested areas. Public information should include information on native species with similar characteristics, e.g., the Pine Sawyer (*Monochamus* spp.) and poplar borers (*Saperda* spp), as people within the state frequently observe these beetles.

The distribution of the EAB is fairly restricted. However, the distribution of the host trees, various species of ash, is continuous from the infested areas to Montana. Because ash is a native species, and easily established from seed, controlling the insect through removal of trees from areas within the flying distance of the current infestations may be difficult. This makes the EAB a somewhat higher risk for Montana.

Natural range of green ash in North America.



At the beginning of 2004, BEBB was found in several western states, although the populations were generally listed as "not known to be established." The primary host, elm, occurs throughout Montana and the west in nearly continuous populations, due to use in shelterbelts as well as landscape plantings, and establishment by windblown seeds. Sampling during 2004 revealed that this insect has made its way into the state, although the extent of the establishment is unknown at this time.

Sampling: Surveys in Montana for Exotic Wood Boring Beetles

Trapping

During 2004, a preliminary survey was conducted for exotic wood boring beetles in Montana. Lindgren funnel traps, baited with *Scolytus schevyrewi* pheromone, were placed at locations in Sidney (known to have European elm bark beetles, *Scolytus multistriatus*), and in Helena. USDA ARS personnel in Sidney maintained the Sidney traps. Additional traps were placed by USDA Forest Service/APHIS PPQ personnel in Billings (3 locations). These USDA traps were baited with pheromone. However, while addition of the lure does increase specificity of the traps, it does not reduce the catch of most other insects, so they can still be used to monitor for other beetles.

USDA-Forest Service and APHIS personnel placing a Lindgren funnel trap in Billings, MT.

Results: Locations of Lindgren funnel traps in Montana, locations, baits used, results and collection dates, as well as placing agencies.

City	Location	Lure	Beetles Collected	Date Set/ Dates Collected	Agencies involved in placement
Billings (Cemetery)	45°46.04' N 108°33.36' W	Ethanol	2 BEBB	13 April 2004/ 30 August 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (Cemetery)	45°46.04' N 108°33.36' W	Exotic *Ips*	1 BEBB	13 April 2004/ 30 August 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (Cemetery)	45°46.04' N 108°33.36' W	Alpha -pinene and ethanol	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (Cemetery)	45°46.04' N 108°33.36' W	*Scolytus schevyrewi*	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS

					PPQ, and MDA
Billings (County Shop)	45°45.43' N 108°30.24' W	Ethanol	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (County Shop)	45°45.43' N 108°30.24' W	Exotic *Ips*	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (County Shop)	45°45.43' N 108°30.24' W	Alpha -pinene and ethanol	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (County Shop)	45°45.43' N 108°30.24' W	*Scolytus schevyrewi*	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (Landfill)	45°42.86' N 108°34.03' W	Ethanol	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (Landfill)	45°42.86' N 108°34.03' W	Exotic *Ips*	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (Landfill)	45°42.86' N 108°34.03' W	Alpha-pinene and ethanol	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS PPQ, and MDA
Billings (Landfill)	45°42.86' N 108°34.03' W	*Scolytus schevyrewi*	NONE	13 April 2004/ 28 Sept 2004	USDA Forest Service, APHIS PPQ, and MDA
Helena	Unknown	*Scolytus schevyrewi*	NONE	15 June 2004/ 15 Sept 2004	MDA
Sidney	Unknown	*Scolytus schevyrewi*	NONE	30 June 2004/ 23 Sept 2004	MDA
Helena	Unknown	*Scolytus schevyrewi*	NONE	30 June 2004/	USDA Forest Service
Great Falls	Unknown	*Scolytus schevyrewi*	NONE	30 June 2004/	USDA Forest Service
Missoula	Unknown	*Scolytus schevyrewi*	NONE	30 June 2004/	USDA Forest

					Service
Missoula	Unknown	*Scolytus schevyrewi*	NONE	30 June 2004/	USDA Forest Service
Kalispell	Unknown	*Scolytus schevyrewi*	NONE	30 June 2004/	USDA Forest Service
Kalispell	Unknown	*Scolytus schevyrewi*	NONE	30 June 2004/	USDA Forest Service

Three BEBB were collected from Lindgren funnel traps placed by the USDA Forest Service/APHIS PPQ in Billings, from samples collected on August 30, 2004. Two specimens were found in traps baited with ethanol and one specimen in a trap baited with exotic *Ips* attractant.

New Course of Action:
With the discovery of BEBB in Billings, the need for additional information on this insect becomes more pronounced. While there is a wide host range listed in the literature, it is not apparent which of the alternate hosts may be exploited in the United States. The damage caused by infestations is unknown, although it is undoubtedly higher in stressed trees. Perhaps the most important unknown is the current range of infestation. Before any plan of action can be created, it is essential that the total area impacted be determined. The current specimens were all from a single location, although from two different traps. Neither was collected in traps baited with the pheromone for this particular species. However, it is documented that Scolytids in general are attracted to ethanol, which is often produced by damaged plants.

Tree Examination Survey

Trees were visually examined in several Montana cities for signs of woodborer damage. All trees within a selected block or group of blocks were examined, until at least 50 trees had been examined. Trees were identified to four groupings: conifer, ash, maple, and other. Each tree was visually inspected for holes in the bark in a two-foot band beginning just below eye level and extending upward. The bark of infested trees had some sort of obvious insect damage, while un-infested trees had intact bark.

Results of tree damage surveys in Montana cities.

	Tree Type				
City	Conifer	Ash	Maple	Other	Total
Helena	1/5	6/31	0/8	1/12	11/56
Belgrade	0/5	0/41	0/6	1/14	1/66
Sidney	1/13	2/5	0/1	10/42	13/61
Billings	1/9	1/3	1/14	1/6	4/32
Missoula	0/18	0/2	0/15	0/15	0/50

Of the trees examined in Helena, 11 had damage caused by wood boring beetles. In all cases, the damage consisted of large, round holes. Most were approximately ¼ inch in diameter. The infested ash were all smaller diameter trees, less than 3 inches in diameter. The infested conifers were all very large (greater than 2 feet in diameter). The remaining tree was an unknown species, approximately 7 inches in diameter.

Of the trees examined in Belgrade (8 miles west of Bozeman), a single *Populus* spp tree had borer exit wound, measuring approximately ¼ inch in diameter. A majority of these trees were mature trees. Four of the conifers examined had “pipes” in their trunks for introducing chemicals, perhaps insecticides.

In Sidney, most of the tree population consists of various elms. The elms of this city are currently under attack by European elm borer (*Scolytus multistriatus*), and many are scheduled for removal. The single exit hole on an ash in Billings was not “D” shaped, and was somewhat larger (1/4“) than an EAB exit hole. In general, the tree survey revealed that wood borers have apparently not impacted most of the trees.

Continued vigilance, particularly of ash and elm, will be needed if early detection (which is essential for any control program) is to occur.

Public Information

Montana is in the process of informing the public of the risk posed by this group of insects. At this time most action is being devoted to education of the portion of the public most likely to encounter these insects in a systematic manner-the horticultural professionals involved in tree care. Presentations have been made or will be developed to present to the various nursery and landscape groups, as well as ornamental and turf pesticide applicators.

Brochures are in the final stages of development to inform the public about the BEBB and the EAB. These brochures will be distributed to the nursery and landscape professionals, as well as to the general public at the appropriate venues.

Perhaps the largest challenge facing us with regard to these beetles is maintaining a proper level of vigilance, or in the case of the BEBB, to determine the extent of the infestation, and to prevent public panic. These insects can have a very detrimental impact on the health and well being of various forests, both urban and rural, planted and naturally occurring, in Montana. However, an over-reaction to their presence, or potential presence, could result in extensive environmental modification with little or no actual impact on the pest spread.

Resources for Education:

Compact Discs

Emerald Ash Borer. 2003. Michigan State University, Educational resources provided by Michigan State University, Michigan Department of Agriculture, Michigan Department of Natural Resources, USDA APHIS, USDA Forest Service.

Emerald Ash Borer: A Potentially Serious Threat to Urban Forests of the Great Plains. 2003. Prepared by Dr. Phillip Mason, Pest Survey Specialist, MT & ND. APHIS

There are numerous websites devoted to various aspects of this insect. A partial, very incomplete list:
http://www.msue.msu.edu/reg_se/roberts/ash/
http://www.na.fs.fed.us/spfo/pubs/pest_al/eab/eab.htm
http://www.na.fs.fed.us/spfo/eab/
http://www.ncpmc.org/NewsAlerts/emeraldashborer.html
http://www.michigan.gov/mda/0,1607,7-125-1568_2390_18298-65294--,00.html
http://www.cips.msu.edu/diagnostics/profiles/eab%20stuff/slideshow/besteab/eabpdf8X11.pdf
http://www.mdinvasivesp.org/eab/eab_general.html
http://www.ncrs.fs.fed.us/4501/eab/
http://www.mdinvasivesp.org/species/insects/Emerald_Ash_Borer.html
http://www.emeraldashborer.info/
http://www.ncpmc.org/NewsAlerts/emeraldashborer.html
http://ashalert.osu.edu/
http://bygl.osu.edu/eab/checklist.pdf

Other sites:
http://ceris.purdue.edu/napis/pests/barkb/schevy/schevyrewi_ID_new1A.pdf

Several of the above resources contain brochures and other materials that can be easily adapted for Montana conditions should the need arise.

Agencies currently involved:
Montana Department of Agriculture
USDA APHIS PPQ
USDA Forest Service

Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program
Sudden Oak Death Survey Report
2004

Compiled by Kimberly Merenz

Phytophthora ramorum, a water mold*,* is the causative agent of Sudden Oak Death, a canker disease of specific oak species, which has caused death and dieback of thousands of trees in California and Oregon since 1995. The current host and associated host list includes species in 68 families. Two of those families include all species, hybrids and cultivars.

In 1993 *Phytophthora ramorum* was detected in California. By May 2004 there were 12 counties in California and one in Oregon that had detected this organism in the natural environment, and were under a Federal quarantine.

On March 10, 2004, the California Department of Food and Agriculture (CDFA) announced that *Phytophthora ramorum* was found at Monrovia Nursery, a large Los Angeles County wholesale horticultural nursery outside of the Federally quarantined areas. The estimated loss in sales for this producer was nearly $1.5 million.

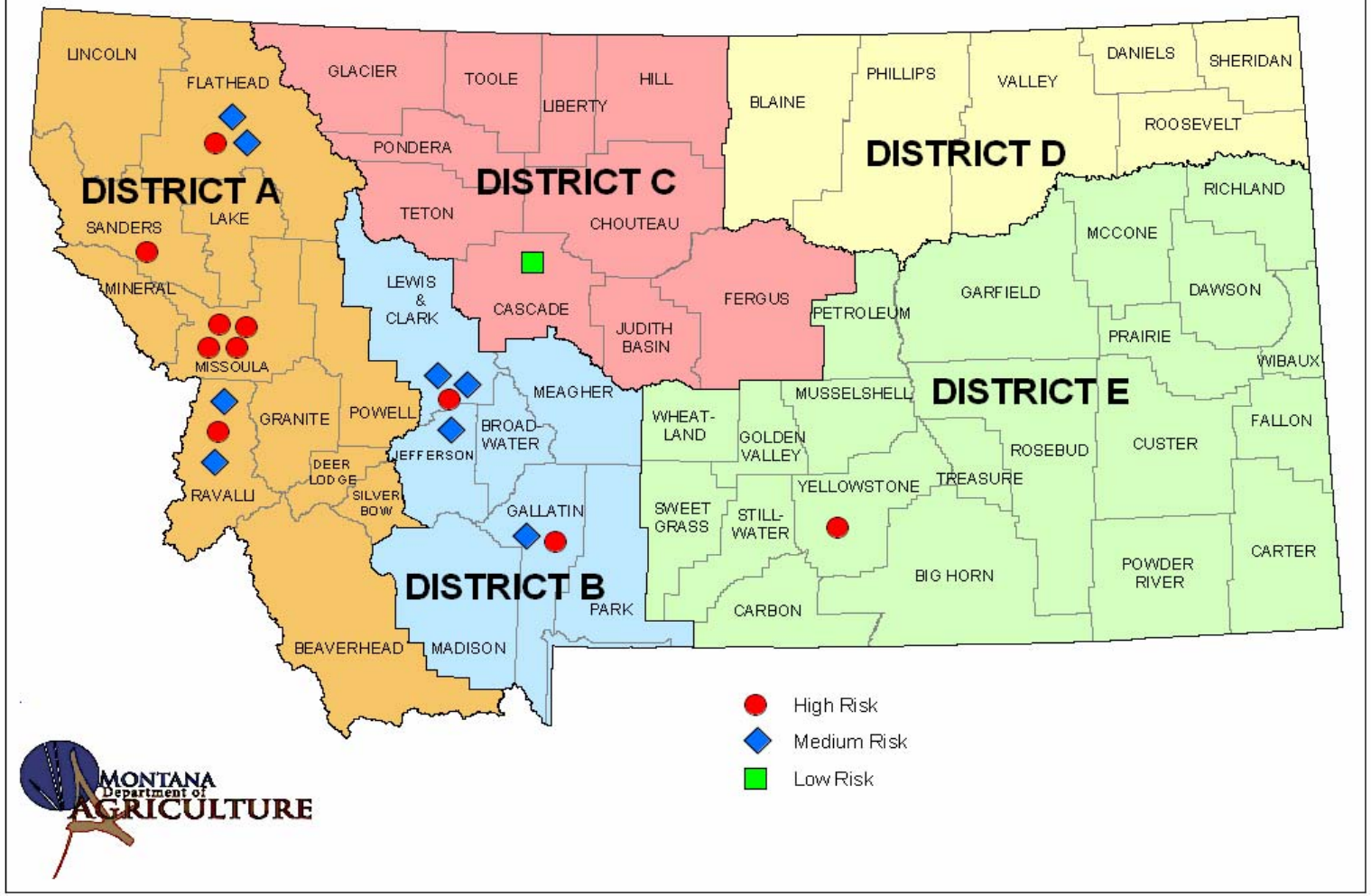
Tree mortality caused by *Phytophthora ramorum*.

The CDFA also confirmed the presence of *Phytophthora ramorum* at Specialty Plants nursery in San Diego County on March 11, 2004.

On March 26, 2004, the United States Department of Agriculture issued a 60-day quarantine of all nurseries throughout California that ship *Phytophthora ramorum* host plants interstate. Due to the discovery of *Phytophthora ramorum* outside the quarantined counties in California, APHIS initiated a national survey for the detection of *P. ramorum.* Each of the 44 continental states and Puerto Rico participated in the survey.

The MDA surveyed 19 nurseries and retail outlets in 9 counties. Of the 750 samples taken, all were found to be negative for *Phtophthora ramorum.*

Facilities Sampled For Sudden Oak Death - 2004



MONTANA Department of AGRICULTURE

Phytophthora ramorum has been detected on these hosts

Coast Live Oak & CA Black Oak

Bay Laurel

Sample leaves

Rhododendron

Sample leaves

Toyon

Sample leaves

Buckeye

Sample leaves

Maple

Sample leaves

Madrone

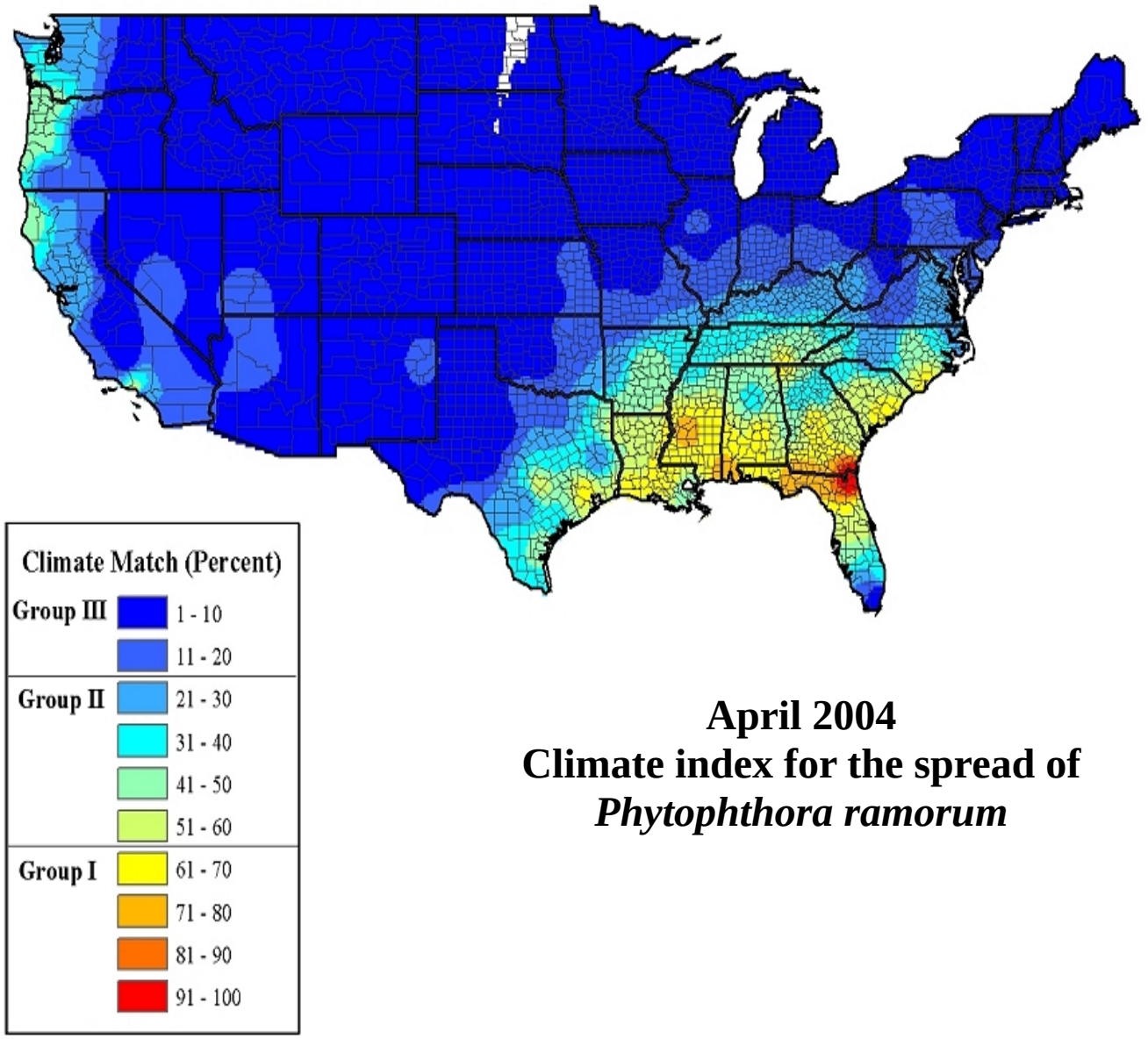
Sample leaves

Tanoak

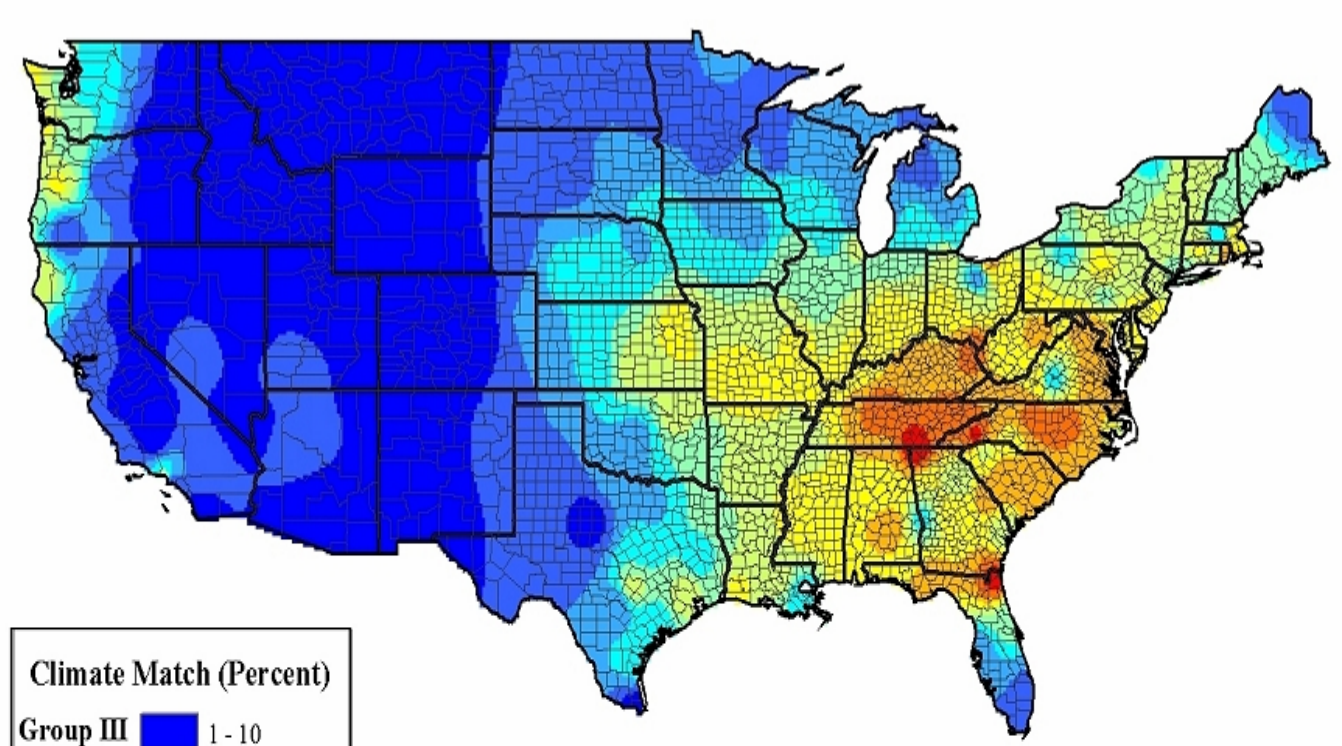
Sample leaves

Manzanita

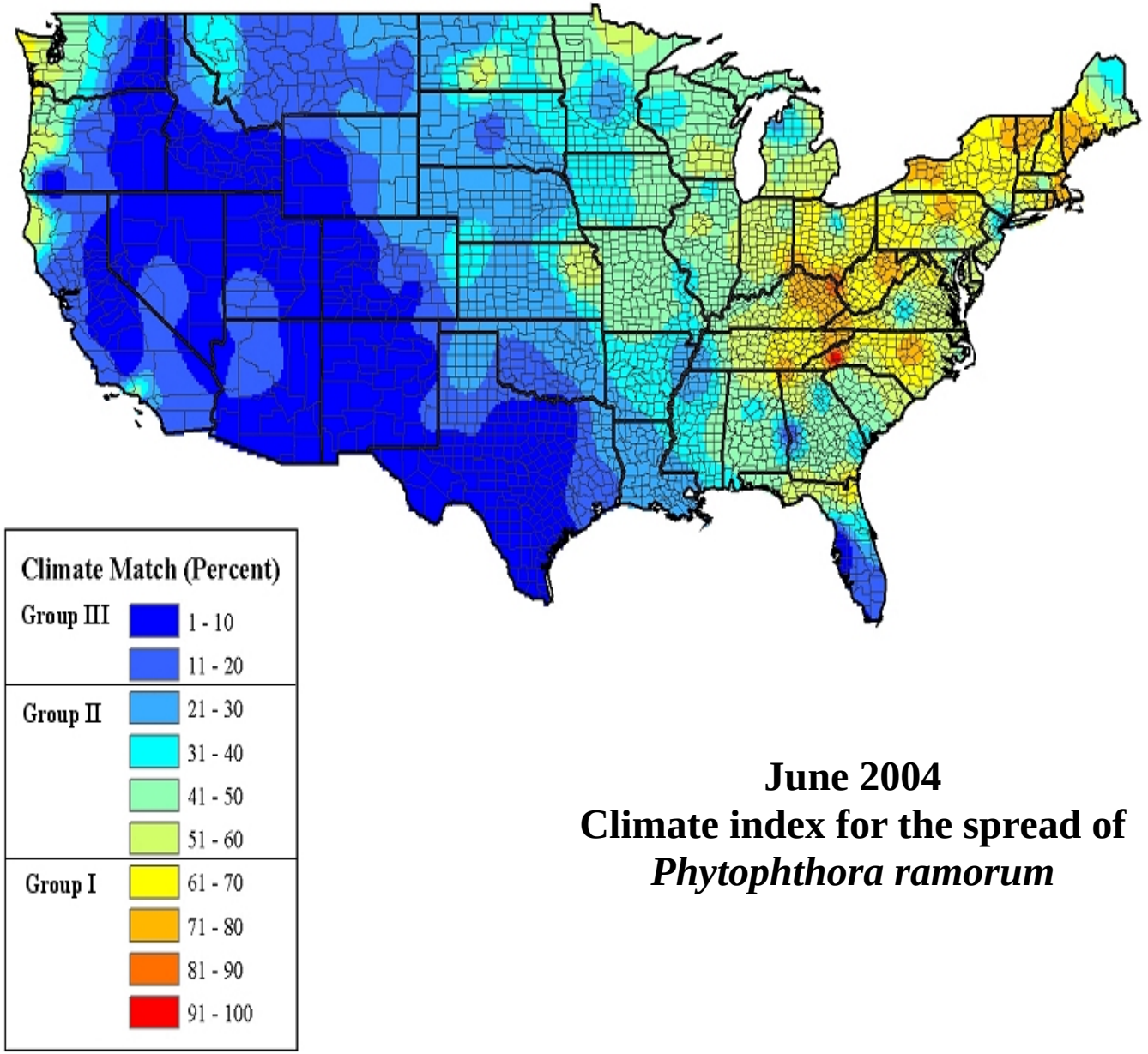
Sample dead branch- on the border between the dead and the live areas.



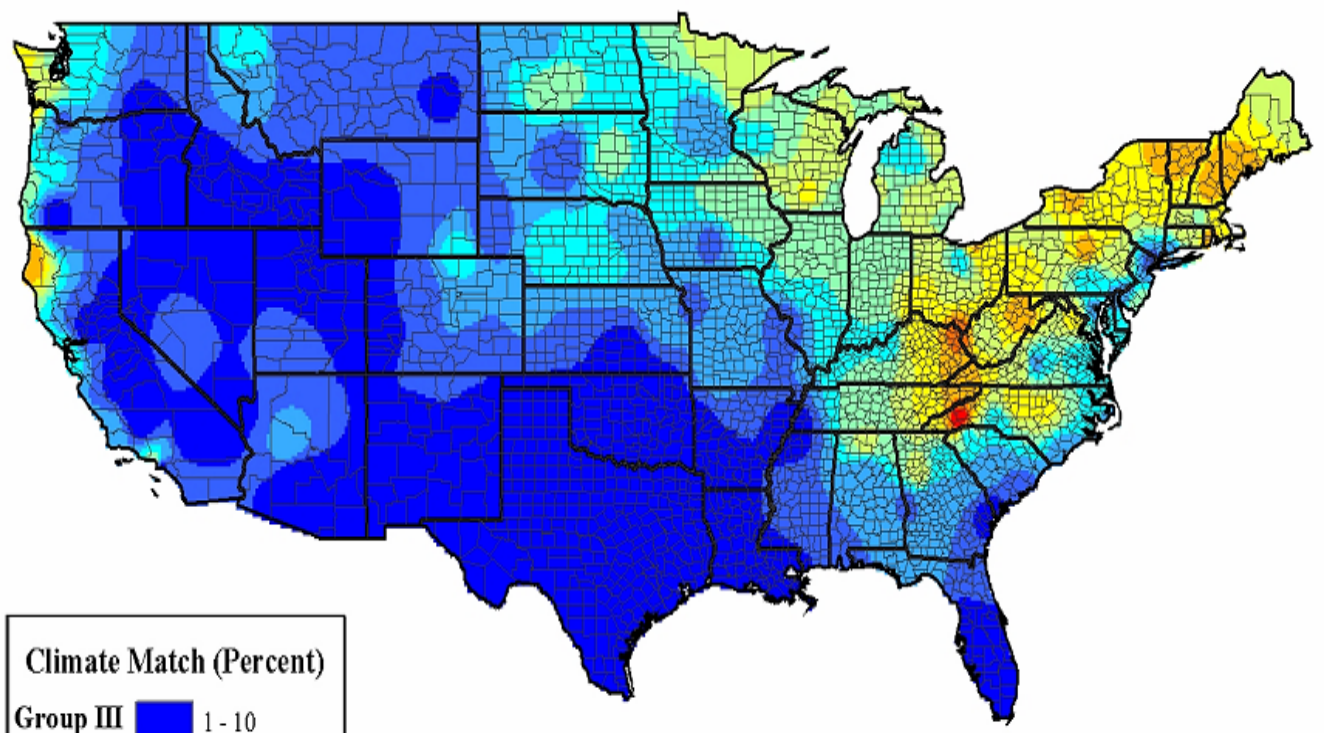
April 2004
Climate index for the spread of
Phytophthora ramorum



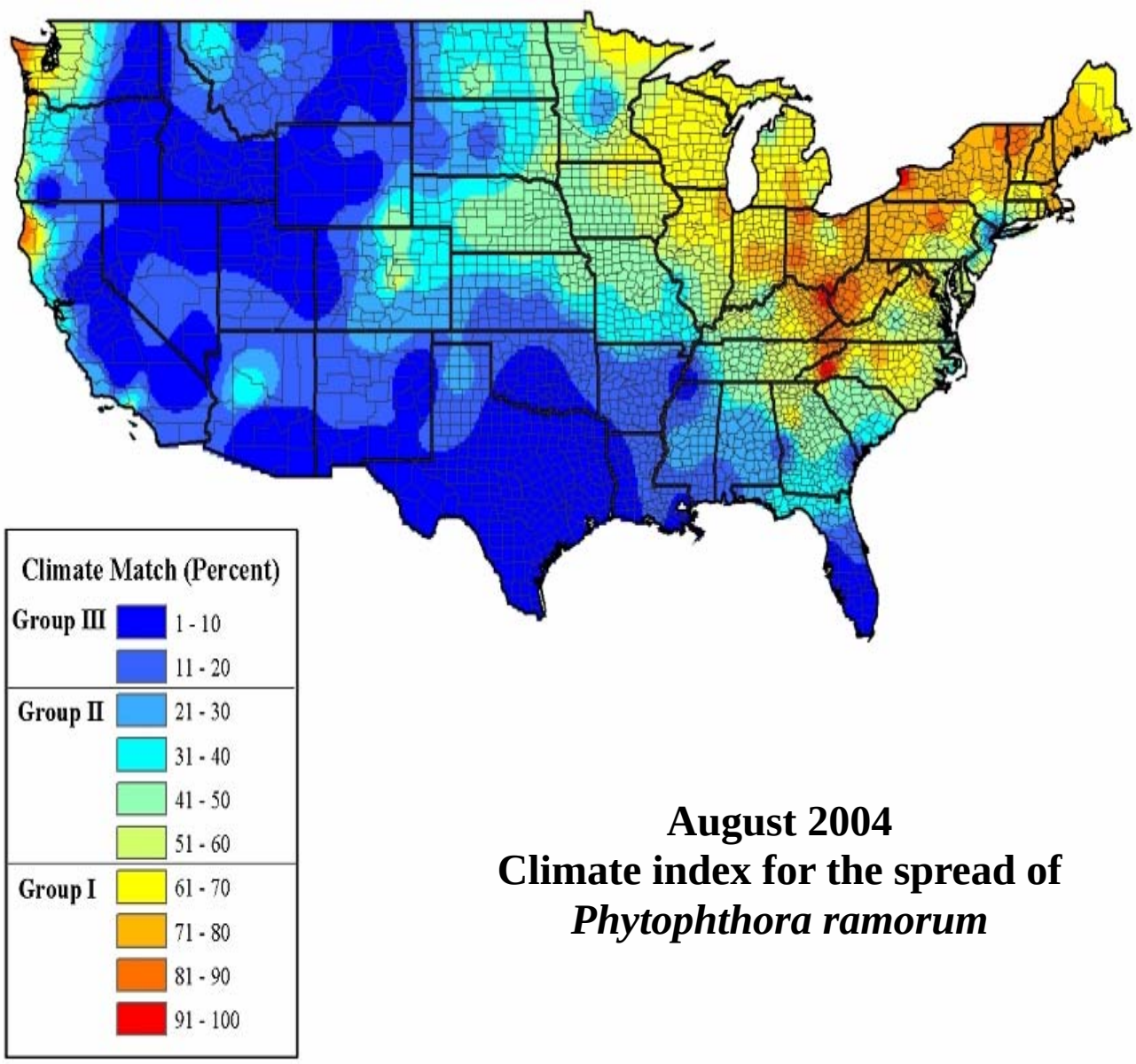
May 2004
Climate index for the spread of
Phytophthora ramorum



June 2004
Climate index for the spread of
Phytophthora ramorum



July 2004
Climate index for the spread of
Phytophthora ramorum



August 2004
Climate index for the spread of
Phytophthora ramorum

Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program
Japanese Beetle Survey Report
2004

Compiled by Patricia Denke

At present, Montana has no established populations of Japanese beetle *(Popillia japonica* Newman). Trapping to detect transported beetles, and guide prevention of establishment of populations has been carried out for several years. During 2004, traps were placed in Billings, Bozeman, Helena, Butte, Great Falls, Kalispell, and Missoula. These areas were selected because they either have large nurseries, or they have airports with significant interstate travel, or both. Traps were placed at airports (one on each side of a square with the main terminal in the center, usually utilizing the airport boundaries, and at the fuel depot(s)) and at major nurseries. A total of 623 traps were placed and maintained by the MDA personnel during the period of time from mid-June to late October.

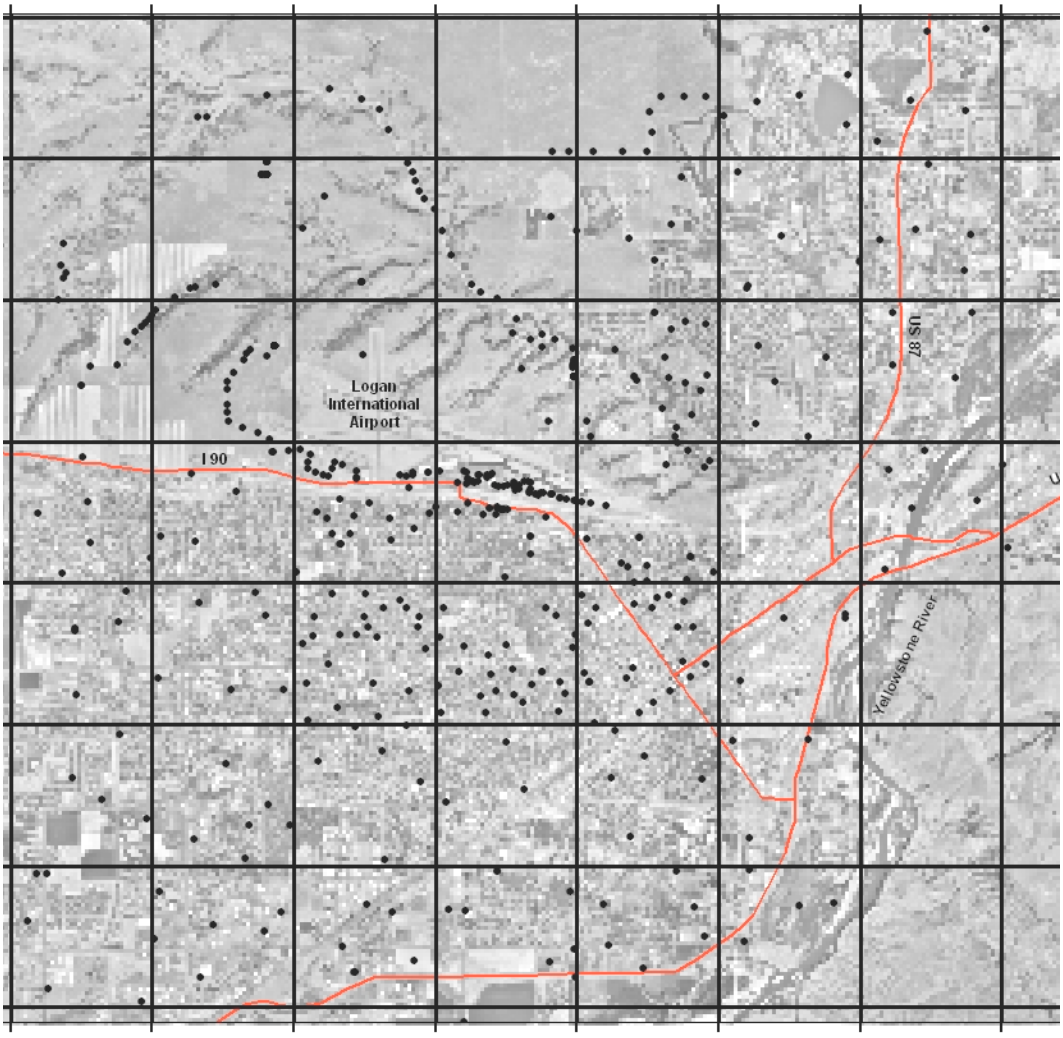
In past years, Japanese beetles (JB) have been collected in pheromone traps in Billings. As a result, the MDA conducted an extensive trapping effort in that metropolitan area. During 2004, the MDA placed 449 Japanese beetle traps in Billings, in a standard delimitation grid.

The placement of JB traps in Billings required 5 days of effort. The first two days of trap placement (10-11 June) involved one seasonal employee, one student intern, and the state entomologist. During this time period, traps were placed on the premises of Billings Logan International Airport, with the assistance of 3 airport employees. It should be noted that because the traps were placed on the inside of the airport fence, airport personnel were required to escort the state personnel. In addition, for logistical reasons, an airport truck was used to carry the traps.

The remaining days (14-17 June) involved additional personnel, the Nursery & Quarantine Specialist and two Agricultural Specialist field officers of the MDA. In total, over 60 hours were spent placing the grid. A seasonal employee was stationed in Billings, with the primary responsibility of checking the traps throughout the summer and inspecting aircraft for JB.

Locations of Japanese beetle traps in the greater

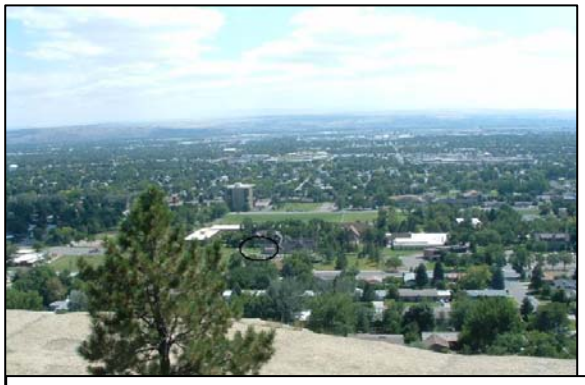
Billings metropolitan area during 2004. Each dot represents a single trap; traps on the northern edge of the airport are not represented. Grid squares are one mile. Red lines are major roads.



All JB traps were inspected at least once during the course of the summer. Traps in the inner portion of the Billings grid, and at various sites outside of Billings were inspected on a two-week schedule, while the remainder of the Billings grid was checked as often as possible. The traps were removed beginning in September.

On August 2, 2004, a single Japanese beetle was collected in a pheromone baited trap on the Rocky Mountain College Campus, located approximately ½ mile from the Billings Logan International Airport. Examination of the area directly around the trap (lawn with interspersed trees and shrubs, a small water feature and buildings) revealed no evidence of white grubs or other insect activity. The soil was typical for Montana; very compacted, silty to silty-loam, and powder dry to a depth of at least 6 inches.

There was no interference with a visual line of sight to the top of the "Rimrocks" from the trap, or from the Rimrocks to the airport. The trap was located directly south of an area used to store cargo containers. It was determined that most likely, the beetle was a "hitchhiker" from cargo planes. An additional beetle was found in September, in a trap located at 2928 Chapman, again near the Rimrocks. Examination of the lawns in the area did not yield visual signs of scarab feeding. This insect is also thought to be a hitchhiker. A third beetle was found in a trap at the end of North Rim Road, again very near the airport and the Rimrocks, in an area landscaped with native vegetation (juniper, sagebrush, and bunch grass).



Location in Billings, MT of first positive Japanese beetle trap in 2004, showing Rimrocks to the north, looking down from the Rimrocks to the trap, and at the site of the cargo containers at the airport

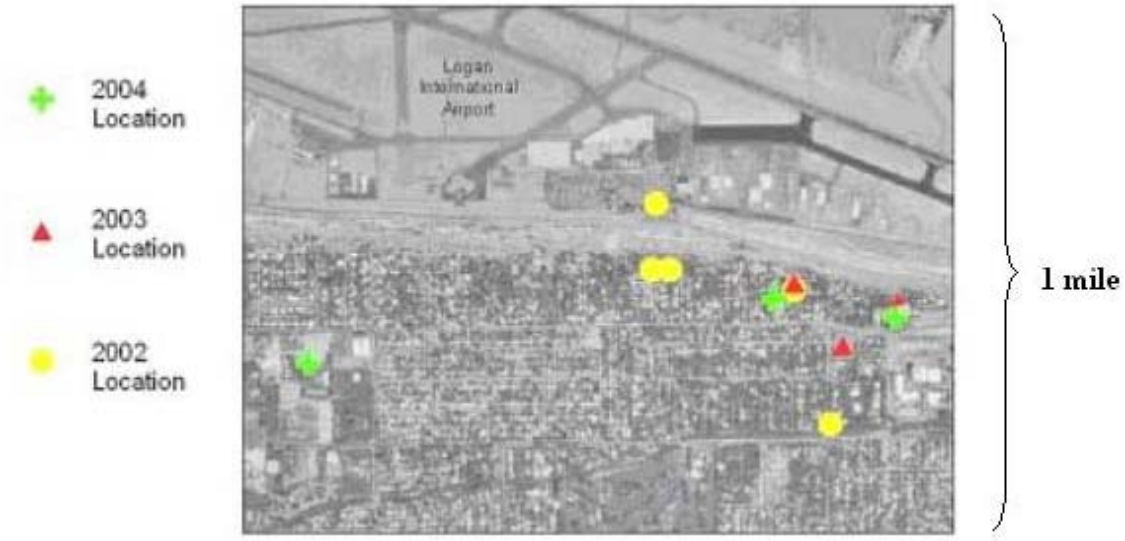
Locations, numbers and results of Japanese beetle trap placements in Montana, 2004.

County	City	Location	No. traps	Date traps set	Date traps removed	Positive Finds
Yellowstone	Billings	City-wide	449	10-17 June	15 Sept	3
Park	Livingston	Nursery	2	15 July	4 Sept	0
Gallatin	Bozeman/Belgrade	Nursery and Airport	8	13 June	4 Sept	0
Cascade	Great Falls	Airport	19	24 June	5 Oct	0
Cascade	Great Falls	Various locations	11	24 June	5 Oct	0
Silverbow	County-wide	Various locations	10	13 July	18 Sept	0
Missoula	Throughout	Throughout	25	10 June	21 Sept	0
Lincoln	Throughout	Throughout	8	29 June	25 Oct	0
Ravalli	Throughout	Throughout	13	9 June	22 Sept	0
Lewis & Clark	Helena	Nursery and Airport	9	13 July	18 Sept	0
Lake	County-wide	Various locations	20	2 June	14 Oct	0
Flathead	County-wide	Various locations	29	2 June	25 Oct	0
Sanders	Throughout	Throughout	20	2 June	14 Oct	0
Total			623			3

The first beetle collected during 2004 was collected slightly west of the previous finds, but still in very close proximity to the airport. The second beetle was in the general area that beetles have previously been found in Billings. The third beetle was again in the same general vicinity.

In examining the total distribution, an area less than ½ mile wide from north to south, has yielded all the beetle specimens, and all (from 2002 to 2004, have been within less than 1 mile of the airport. An overall picture of all finds in Montana indicates that a primary risk factor is proximity to the airport, with secondary risk factors apparently being direction (south, or downwind, from the airport, terminal side), and in the relatively open areas just below the Rimrocks.

Location of positive Japanese beetle finds in Billings since the beginning of the Japanese beetle trapping program.



Montana Department of Agriculture
Cooperative Agricultural Pest Survey Program
European Pine Shoot Moth Survey Report
2004

Compiled by Patricia Denke

Although the MDA does not have a formal Cooperative Agriculture Pest Survey agreement to survey for the presence of European Pine Shoot Moth, this insect is a potentially serious pest to specific portions of Montana. As a result of concern in those agricultural communities, the MDA does limited monitoring in specific nursery and pine plantation areas.

The European Pine Shoot Moth (*Ryacoinia bouliana* Denis & Schiffermuller) is a pest of pines, particularly those grown for aesthetic purposes. A majority of the preferred hosts found in Montana are being produced for either landscape or Christmas tree use, making appearance of the tree a primary consideration. Feeding by the larvae of the EPSM may cause development of forked tops, and in high populations, a brushy growth habit.

There are several native species of pine shoot moths, which are indigenous to the same areas as their preferred host trees. The damage these moths cause is similar in appearance to that caused by the EPSM. The immature stages of these moths are all very similar in appearance.

Pine with a forked trunk due to feeding by EPSM larvae when the tree was very young, brushy growth due to EPSM larval feeding.

During 2004, the MDA placed 32 traps baited with EPSM pheromone. There were no detections.

Placement of European pine shoot moth traps, with number of traps and results, summer 2004.

County	No. Traps Placed	No. Positive Traps
Missoula	3	0
Mineral	2	0
Ravalli	3	0
Lincoln	12	0
Sanders	6	0
Flathead	6	0
Total	32	0